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THE Journal OF THE AMERICAN DENTAL ASSOCIATION

DECEMBER 1948 • VOLUME 37 • NUMBER 6

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THE Journal OF THE AMERICAN DENTAL ASSOCIATION

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A FORWARD LOOK AT DENTISTRY

Leonard A. Scheele, M.D., Washington, D. C.

NINETEEN hundred and forty-eight marks an important milestone in the history of the United States Public Health Service. It is our one hundred and fiftieth anniversary. But 1948 will go down in our annals as a memorable year for an event far more significant than a birthday. It is the year in which Congress, considerably stimulated by the American Dental Association, passed the Dental Research Act. This year, too, Congress appropriated a special fund for a nation-wide demonstration on the prevention of dental caries among children by means of topical applications of sodium fluoride to their teeth.

The policy of the Public Health Service is to advance national health by the processes of research, demonstration, education, practical aid and leadership. The laws under which we operate support that policy. Obviously, we cannot administer such laws without the confidence of the organized professions, of state and local official agencies and of civic groups.

The American Dental Association, for many years, has reposed great confidence in the Public Health Service. On behalf of my colleagues and personally, I want the nation's dentists to know that we cherish your confidence. We are deeply sensible of the help you have given to our organization in many situations.

It is my earnest desire that the Public Health Service shall contribute fully to the solution of any problems that affect the health of the American people. I believe that we can do so most effectively by cooperating with the professions, institutions and agencies which provide health services and medical and dental care. Therefore, we look forward with personal and professional satisfaction to working more closely in the future with the dental profession.

I should like to review briefly some of the activities of the Public Health Service to show how it has gradually adapted its program to tackle health problems of national concern.

Delivered at the opening general session of the American Dental Association, Chicago, September 14, 1948.

Surgeon general, U. S. Public Health Service, Federal Security Agency.

Establishment

The Public Health Service was established as the Marine Hospital Service in 1798, to provide medical care and hospitalization for sick and disabled seamen sailing on American merchant vessels. This event occurred 42 years before the founding of the first dental college in the United States.

Our organization did not become a public health agency until the last quarter of the nineteenth century. This was a logical development, because the public health movement did not begin to take shape in the United States until that time. Fear of epidemics stimulated the expansion of public health activities, both to prevent the introduction of diseases from abroad and to control their spread within our borders.

The birth of bacteriology gave the public health movement a scientific basis upon which to plan and execute an effective attack on communicable diseases. The Public Health Service began a planned program of fundamental research and epidemiologic investigations in 1887.

Interdependence of Programs

Since the turn of this century, the work of the Public Health Service has become one large central stream into which flow the three major types of professional endeavor; namely, scientific research, clinical practice and public health administration.

These are inseparably dependent, one upon the other. The body of scientific knowledge informs, and the scientific approach directs, all our activities. Our research guides the care of patients in our hospitals and dispensaries, aboard Coast Guard vessels and at quarantine stations. On research are founded our programs for the control of disease, environmental sanitation and promotion of personal health.

The public health and medical care programs so established, in turn, are proving grounds for the basic findings and technical procedures provided by our programs of fundamental and applied research. And both the field services and the hospital programs constantly pose new problems which scientific investigation must answer.

Scope of Services

The Public Health Service does not provide medical and dental care for the general population, as you know. In the entire field of public health services, our major activity is assistance to state agencies and, through them, to the communities and people. The administration of federal grants-in-aid is only one phase of our cooperative program with the states. We provide expert consultation for the planning and operation of general and specialized public health services. On request, we assign personnel for the conduct of special studies or to administer a program in its formative stages. Sometimes we develop and provide special equipment and materials. Again, the Public Health Service may act as the central agency for the collection of nationwide data on a particular problem. The results of the fact-finding study, in turn, are used to define the scope and nature of the problem, to guide future activities, to evaluate the efficacy of particular methods and so on.

Examples of the activities I have mentioned may be of interest. Currently, Public Health Service officers are in charge of the central health departments of the states of Florida, Indiana and New York, and two foreign governments, the Philippine Islands and Liberia. In addition, dental officers are assigned to state health departments, and others are conducting special demonstrations in several communities.

I am sure that most of you know that our experts played a key part in the de-

velopment of the small-film photofluorographic equipment which now serves our nation so well in mass tuberculosis case-finding. Furthermore, we provide mobile equipment to communities to aid them in the conduct of their chest surveys.

During 1933 and 1934, in cooperation with the American Dental Association and state and local health departments, and with the assistance of 8,000 practicing dentists, the Public Health Service surveyed dental conditions in approximately one and a half million school children in twenty-six states. This is the largest collection of data ever made on children's dental health. A classic in the field, this report by Messner, Cady and others probably is known to most of you.

Development of Dental Activities

To a superficial view, the growth of dentistry and dental programs in the Public Health Service may seem slow. But a more careful study of the facts shows the reverse.

Dentistry itself did not emerge as a distinct, learned profession until late in the nineteenth century. Before the last quarter of that century when Miller and Black put dentistry on a scientific basis, treatment of diseases of the mouth, other than extractions and the fitting of dentures, was the exclusive province of medicine. Not until 1912 was the Public Health Service able to conduct research on any conditions except contagious diseases. And not until 1918 were we authorized to provide dental care for our beneficiaries. These limitations did not exclude our interest in diseases of the mouth, for the condition of seamen's mouths, for many centuries, has been known to be extremely bad. Long voyages away from dental service, inferior diet, poor personal hygiene—these are some of the obvious contributory factors.

Consequently, after 1918, when the Public Health Service began to employ dentists to render care to its beneficiaries, our medical officers became increasingly aware of the importance of dentistry to the care of their patients, and of its interrelation with medical service. Until 1930, however, dentists worked as reserve commissioned medical officers, without opportunities for internship, residency, progressive promotion or other advantages of our regular commissioned corps.

The Parker Act of 1930 opened regular corps commissions in the Public Health Service to dentists and sanitary engineers. In 1931, 36 dental officers held commissions in the regular corps. Today there are about 200 dental surgeons on active duty; they compose about 10 per cent of the total active corps of 2,000 dentists, scientists, physicians, sanitary engineers and nurses. Fourteen years later, the Public Health Service Act of 1944 established a position of assistant surgeon general on the surgeon general's staff for the chief dental officer of the corps. Two officers have held that post: Dr. W. T. Wright (1944-1948) and Dr. Bruce Forsyth, the present incumbent. Thus, in 26 years, the dental profession has established itself as an integral part of the Public Health Service.

Growth of Dental Research

It is of special interest that, immediately after 1930, the first specific dental research was undertaken in the National Institutes of Health, our principal research arm. Dental health studies at first were in charge of the late Dr. Clinton Messner, who did so much to establish dentistry in the Public Health Service. Never until this year has the Service had more than a few tens-of-thousands of dollars to spend annually on dental research. During this year, $173,000 is available for that research. The staff of dentist-investigators has been small indeed. Their accomplishments have been so great, in proportion to their number and to funds at their immediate disposal, that one can scarcely predict what the

outcome will be when they have the increased staff and facilities we hope will be provided in the new National Dental Research Institute.

I am sure our group of loyal and talented investigators will be the first to say with me that their achievements were made possible because of the free interchange of all knowledge, facilities and services in the National Institutes of Health. Hundreds of research specialists, representing all manner of disciplines in biologic and related fields, are at work in our laboratories. If a dental investigator needs the help of a pathologist, a biochemist or a cytologist, he can get it in his own research center. Interdisciplinary study and interdisciplinary collaboration are the rule.

Some Contributions

Although scientists in various fields have contributed to our dental research activities, I know you are particularly interested in the dentist-investigators. Dr. H. Trendley Dean is, indeed, our "dean" of dental research. It gives me great pleasure to announce here, at the meeting of the American Dental Association, the appointment of Dr. Dean as director of the new National Dental Research Institute.

Dr. Dean's co-workers in the mottled enamel studies initiated nearly 20 years ago included Dr. Elias Elvove, a water chemist, and Dr. F. J. McClure, a biochemist.

Public Health Service research workers, responding to the implications of the studies in dental fluorosis, in 1938 showed that dental decay and the presence of fluorine in the public water supply of a community are correlated in inverse ratio. And they established quantitative relations between amounts of fluorine in water supplies and the extent of caries and of dental fluorosis. In January 1945, the Public Health Service launched a ten year study in Grand Rapids, Michigan, to determine the effect on the incidence of caries of the addition of fluorine to a public water supply. Other cities are now trying similar experiments.

In 1942, Dr. John Knutson of Public Health Service initiated a study of topical application of sodium fluoride to the teeth of children, a study which I shall discuss in greater detail later.

Contributions to scientific knowledge in a given field often are not "sensational discoveries" of a new cure or preventive. Some of the most difficult, most valuable and least acclaimed studies seek to find a basic way of gaining more knowledge. Thus the introduction by Dr. Francis A. Arnold, Jr., of the Syrian hamster as an experimental animal has given us a new tool for research in dental caries.

Very valuable, also, is Dr. E. G. Hampp's development in the National Institutes of Health of a method for growing pure cultures of oral spirochetes, especially those associated with oral infections. Dr. Hampp is an American Dental Association research fellow.

Negative findings, likewise, often are as valuable as positive determinations. Dr. Hampp also has demonstrated that stained smears are unreliable in diagnosing Vincent's stomatitis.

Surveys for More Efficiency

The Public Health Service also does research in the social sciences such as biostatistics, health economics and demography. Demonstrations concerned with the provision of dental services are being conducted to determine: (1) the amount of dentists' time, the number of auxiliary personnel and the costs involved in meeting all accumulated dental-service needs of elementary school children in a community; (2) the same factors involved in treating the annual increment of dental needs of children whose accumulated needs had been cared for previously, and (3) the incidence and extent of decay in children's teeth when com-

plete dental care is provided. On the basis of these findings, we can develop new and improved technics for the treatment of dental defects and abnormalities in school children.

Two communities are being studied in cooperative dental care investigations, Woonsocket, Rhode Island, and Richmond, Indiana. Each of the studies will extend over a six year period. In Woonsocket a team of six dentists, eight dental assistants, one dental hygienist, four clerks and a follow-up worker is now concentrating on the second phase of the program mentioned earlier, meeting dental needs as they arise. They are also applying sodium fluoride to the teeth as a caries-preventive measure.

Already, we have learned important facts from these projects. Two dentists, for example, utilizing the auxiliary services of three chair-side assistants, can appreciably increase their output of dental services. When facilities are readily accessible to children, dental services are fully utilized.

Perhaps most important of all, we have learned that dentistry for children can be made attractive to dental clinicians. This can be done by such practical measures as supplying dentists with enough modern equipment, with good facilities and with opportunity for postgraduate training. Dentists assigned to these projects have received training in pedodontics, in the use of auxiliary personnel and in correct manipulation of dental materials. The in-service training in these two projects is made possible through the generosity of several of you who serve as teaching consultants.

Topical Application of Fluoride

And now I should like to return to our new program for the topical application of sodium fluoride to the teeth of children. Prolonged investigations made it possible recently to recommend for general use four topical applications of a 2 per cent solution of sodium fluoride, after thorough dental cleansing at the time of the first treatment. The technic is an effective method for reducing the incidence of dental caries by 40 per cent or more.

Encouraged by these findings, Congress appropriated $1,000,000 to be used in establishing a topical fluoride demonstration unit in each state. Thirty-two states have already requested demonstrations.

The purpose of the program is to demonstrate the technic to dentists and dental hygienists in private practice and in state, local and other health agencies, and to encourage the establishment of continuing community programs. Each of these demonstration units will be staffed by a dentist, two dental hygienists and a clerk. The units will be mobile and the equipment portable. Plans for the demonstrations were worked out at a conference of state and territorial dental health directors with the Public Health Service and the Children's Bureau in June of this year. Actual work will begin in the very near future. Of course, these demonstrations are carried on in cooperation with state health agencies and with state and local dental societies.

I realize that the topical application of sodium fluoride is not a new idea to you. A spot-check survey conducted last March showed that, largely through alert dental societies, almost 90 per cent of the dentists in this country had been informed of the effectiveness of the new technic, and that many dentists either were giving the treatment or were prepared to do so. Consequently, we are not faced with the problem of introducing a new subject to the dental profession.

We are, however, impressed with the fact that not enough dentists are giving these treatments. The full cooperation of dentists, both individually and through their societies, is vital to the success of the demonstrations I have described. It is hoped that these Public Health Serv-

ice demonstrations will serve as a stimulus to wider use of topical fluoride in private practice in all states, at the same time that they show the correct technic. It is the responsibility of the dental profession to assure every child of the caries protection which this treatment affords.

Assistance to States

Federal assistance to states in dental health programs is not a new idea. Through grants-in-aid, technical aid and consultation, the Public Health Service and the Children's Bureau have assisted in the establishment of state dental health programs for the past ten or twelve years. More recently, federal aid from cancer control funds has been made available to dental schools for the training of dentists in the detection of oral cancer. Thirty-four of the forty dental schools in this country are now utilizing these funds for undergraduate and postgraduate training in cancer.

Dentists with graduate training and experience in public health administration, assigned by the Public Health Service to eight of its ten regional offices, stand by to assist in planning for dental health at state and local levels.

At present, health departments of forty-four states, the District of Columbia and Puerto Rico have active dental health units. The activities of these units, however, vary widely. Some programs include dental care for indigent children. Some are concerned only with surveys to determine the prevalence of dental disease and the extent of dental care received. Still others attempt to promote regular dental care by giving periodic examinations in the public schools and referring children who need care to their private dentist or to public clinics.

Unsolved Problems

The topical fluoride program provides an approach to preventive dentistry for the control of dental caries. But knowledge of dental caries is by no means complete. There are so many unsolved problems in dental and oral pathology that no one should be surprised at the prevalence of dental disease. To suggest profitable lines of research, one has only to list the conditions seen by the average dentist thousands of times each year: pyorrhea, Vincent's stomatitis and other periodontal diseases; malformations of the jaw; atrophy of the bony structure; oral neoplasm, and the like. Expansion of dental research, with intensive investigations of fundamental as well as clinical problems, is long overdue. Without it, we can never broaden our attack on dental diseases to the point where pathologic processes in the oral cavity can be prevented, or at least be effectively arrested.

The important field of periodontal diseases, especially, has been too long neglected. A full scale attack on this group of dental diseases should be launched immediately. Few adults escape the destructive degenerative diseases of the supporting structures of the teeth and infections of the soft tissues of the oral cavity.

Responsibility for Diagnosis

The dentist must ever keep in mind that the tissues of the mouth are the stop and go lights, the red and green signals of disease and health, and that he must heed and interpret these signals. Often he is the initial diagnostician who refers the patient to the cooperating specialist for further care. His action may be definitive and life saving.

Let me remind you of some of the specific situations you may meet in daily practice. You may be the first to detect the chancre of syphilis, the leukoplakia that may be a precursor of cancer, or the full-blown cancer itself. In the oral examination don't hesitate to palpate lesions you see and don't hesitate to feel for lesions in spite of the fact that they may not be apparent to the eye.

Think of fungus infections—moniliasis, sporotrichosis and blastomycosis—when you see inflamed gingivae. And don't forget diabetes.

Concern yourself when you see pigmentation that may signal Addison's disease. The possibility of blood diseases like leukemia, pernicious anemia and sprue must be in your mind when you look in the mouth. Although your patients, in general, are better nourished nowadays than in the past, you will still see evidence of avitaminosis and oral manifestations of scurvy and pellagra.

Be on the alert also for industrial poisoning. Think of lead lines and of effects of mercury in some of the working men and women who come to you. You may be the first to call attention to an overexposure, and industry and labor will thank you for your help.

Necessity for Basic Research

With a multiplicity of problems to be solved, dental research should not be confined to medicaments, methods of treatment of caries and the making of restorations. Rather, major attention must be given to etiologic factors, fundamental tissue changes, physiology of aging tissues, metabolism, heredity, nutrition, systemic disease, and better methods of classification and early diagnosis of minor tissue alterations.

The answers to periodontal disease problems must be found by fundamental research. When they are found, the proper preventive measures may be developed to control these diseases. As was stated in a recent editorial in THE JOURNAL OF THE AMERICAN DENTAL ASSOCIATION, ". . . until methods are developed to prevent periodontal diseases, dental caries control will simply save more teeth for periodontal disease to attack."[1]

When we consider the importance of physiology, heredity and environment, it becomes clear that close integration of dentist research workers with investigators in the biologic and other sciences is essential. Indeed, the expansion of fundamental and background research constitutes the major challenge confronting dentistry today. But this needed expansion is seriously handicapped by the very limited number of dental investigators with graduate training in the basic sciences.

It is, of course, essential that all disciplines bearing upon the solution of a problem be utilized fully. Numerous investigators, thoroughly trained in one or another of the basic sciences, will make notable contributions to the advancement of dental research, as they have in the past. A proportionate share, however, must be contributed by men trained in the disciplines of dentistry. As is true of any profession, dentistry will be judged by the quality of the research contributed by its own members.

The Opportunity

The passage of the Dental Research Act last June gives dentistry this long awaited opportunity. The newly created National Dental Research Institute makes possible the expansion of investigations in that long neglected field. The Institute is authorized to conduct, on its own, basic and applied research in the dental field. But of even more interest and importance is the authorization to make funds available to public and private institutions for research and training.

Under the general research grants program of the National Institutes of Health, the Public Health Service is already spending $185,000 in support of dental research projects in nonfederal institutions.

Our program of aid to general medical and dental research was initiated three and a half years ago. The passage of the Dental Research Act will make it possible substantially to augment research in this field, if Congress ultimately appro-

1. Research: The Key to Prevention of Periodontal Disease. *J.A.D.A.* 37:351 (September) 1948.

priates the funds authorized by the Act.

The number of young dental graduates preparing for a career in teaching or graduate research is wholly inadequate. Many dental schools apparently do not apply for research grants because of the lack of trained investigators.

Perhaps dental graduates have not been attracted to graduate study in the basic sciences preparatory to a career in research because of the lack of financial support, both during their training and later when they work in the laboratory as full-fledged research workers. The new dental research program will provide support for them and should stimulate more students interested in dentistry to enter the research field as a career. Of course, deans and faculties of dental schools and research-minded practitioners will have to encourage these young people to take additional training. That is a current need and will be a continuing need in the future. The healthy development of dental research is dependent upon the increase in interest and consequent expansion in dental research in all dental schools, as well as in schools of basic science.

Fellowships of the National Dental Research Institute will not be confined to dentist investigators but will also be awarded to students in the basic sciences related to dentistry. In addition, we shall be able to award traineeships to dental clinicians for postgraduate study in the diagnosis, prevention and treatment of dental disease. The Act makes possible financial aid to dental schools for the expansion of their teaching programs. Aid to the individual school must be on a small scale because the law sets a limit of $750,000 on the total annual appropriation for the Dental Research Institute. However, the stimulus of the new program should result in greater accessibility and a higher quality of training than are now generally available. The shortages of research personnel and specialized clinicians should be partially met.

National Advisory Dental Research Council

The Dental Research Act establishes a National Advisory Dental Research Council to be composed of twelve leaders in science, education or public affairs, six of whom "shall be selected from leading dental, medical, or scientific authorities outstanding in the study, diagnosis, or treatment of dental diseases." The law provides that at least four of the scientific authorities shall be dentists. The surgeons general of the Army, Navy and Public Health Service, and the chief medical officer of the Veterans Administration are ex officio members of the Council.

The Council is charged with the responsibility of reviewing all applications for research grants and recommending worthwhile projects to the Surgeon General for his approval. In planning thus for the support of research, the Council can guard against useless duplication of effort, so that available facilities and personnel can study as many urgent problems as possible.

In prescribing broad professional and civic representation on the National Advisory Dental Research Council, Congress clearly intends that study of the nation's dental problems shall be closely related to the expressed needs of the people. On that Council will be dentists with broad interests in a variety of dental research fields, including fundamental science, education and public health dentistry. In addition we shall endeavor to have widespread regional representation in both the professional and public representatives. I hope to be able to announce the members of the first National Advisory Dental Research Council within the next few weeks. I should point out, too, that this Council will receive technical advice from the experts of our Dental Research Study Section of which Dr. Paul C. Kitchin, a member of your Research Commission, is chairman. The

Study Section has been a technical advisory committee of the National Institutes of Health in the field of dental research since 1946. On it are fourteen experts not in government service. The Dental Research Act provides that the Council advise essentially on matters of research and education. However, I propose to have the Council advise on all dental matters in the Public Health Service.

Dentistry and Total Health

So far I have been discussing progress that has been made in dentistry and plans which may be implemented by Congressional appropriations. Now I should like to look forward a bit to the future and envision a day when dental problems are consistently dealt with as inseparable from mental and other physical problems; when dental health is universally considered an integral part of the total health of each individual.

In the curriculum of every medical school, I should like to see a broader treatment of dental problems than the cursory review of oral diseases that is now given in most schools. I should like to see more dentists engaged in this orientation of physicians. And, conversely, I should like to see oral disease taught in dental schools with more reference to systemic disease and with more medical participation. Also there is an urgent need for the teaching of more basic sciences related specifically to dentistry in the dental schools.

I should like to see dental clinics and dental laboratories housed in each of our large hospitals, with administrative arrangements for services to smaller institutions in the area. Such a coordination not only would permit complete care of patients, but also would provide more internships and residencies and more facilities for clinical research in dentistry. The physical examination of every individual entering a hospital would then include a thorough dental examination, including roentgenograms when indicated; not the quick glance into the mouth that too often is given.

And, equally important, coordination of services would bring together dentistry and medicine, with other professions and technologies, to do a better job, a total job of health care. I heartily endorse clinical specialization, but I decry its practice within "water-tight compartments," and without realization of the need for an interdisciplinary, integrated approach to the study of the whole man.

Coordinated Research

The same philosophy applies to the field of dental research. Dentistry, indeed, needs the foundation of basic research in many related disciplines in order to become fully integrated with the medical sciences. Synthesis, both in clinical practice and in scientific study, is the guiding principle of the future. The impressive body of knowledge resulting from specialized study, itself, has taught the professions an important truth: The human organism must be studied as a whole and treated as a whole, if we are to understand the mysteries of health and disease. The relation of dental and oral status to the total organism will remain obscure as long as dental investigations are conducted in isolation and as long as major emphasis is placed on applied research.

In planning public health programs we must look toward a like synthesis, so that comprehensive diagnostic services, including dental diagnosis, can replace the present separate "screening-campaigns" to detect syphilis, tuberculosis, cancer, diabetes, dental disease, heart disease and so on. Industrial hygiene has led the way in developing comprehensive health inventories, in connection with preplacement examination and on-the-job medical service. The health inventory has been adopted in the majority of our

large industrial establishments, and a few have included comprehensive dental examinations.

A Comprehensive Approach

In the future I should like to see the complete health inventory, with dental examination and with periodic follow-up, made available to the entire population, both in private practice and through the health agencies, hospitals, schools, industries or other voluntary organizations. Until such a comprehensive approach is made to national health, we shall not be able to uncover signs of ill health or symptoms of disease in the earlier stages when the chances are best for prevention, arrest or cure.

The coordinated approach in research, clinical practice and public health administration gives all the professions a better opportunity to bestow the benefits of science on society. The dentist and his assistants are indispensable members of the team that will attain that goal.

In the next-coming years, I look forward with special pleasure to working more closely with the dental profession and especially with the American Dental Association, for the advancement of national health. I appreciate the opportunity to express my philosophy for future progress in dental and interrelated fields.

ECTODERMAL DYSPLASIA, ANHIDROTIC TYPE: REPORT OF CASE

Laren W. Teutsch, D.D.S., and Joseph T. Hartsook, D.D.S., Ann Arbor, Mich.

A CAREFUL search of the literature of the last twenty years indicates that 70 cases of ectodermal dysplasia of the anhidrotic type have been reported. The similarity of the facial characteristics is remarkable.

The reported features characteristic of ectodermal dysplasia may be grouped into the triad of (1) anodontia (absence of the teeth), (2) hypotrichosis (partial or complete lack of hair), and (3) anhidrosis and asteatosis (an abnormal deficiency of sweat and sebaceous secretion). Conspicuous associated manifestations of this syndrome are an abnormality of the nails, deficiencies of the lacrimal, conjunctival, pharyngeal and salivary glands, protuberant lips, depressed saddle-nosed appearance, atrophic rhinitis, hyperpyrexia and dysphonia.

Aplasia of the dental structures may be classified as: (1) total anodontia, a complete absence of both primary and permanent teeth, and (2) partial anodontia, with the absence of one or more of either the primary or permanent teeth but with the presence of some teeth.

The genetic basis of this anomaly has been investigated by a few observers. Like color blindness (red-green) and hemophilia, the heredity sometimes, at least, is based on a sex-linked recessive trait.[1]

Children's Clinic, School of Dentistry, University of Michigan.

1. Davison, W. C., Heredity and Genetics. *Am. J. Orthodont. & Oral Surg.* 29:33 (January) 1943.

Fig. 1.—Patient, aged 9 years and 8 months. Left: Front view. Right: Lateral profile view

In the case reported in this paper, no other member of the family is known to have been affected, and no evidence for or against the heredity of the triad was obtained.

Thoma[2] stated that "anodontia must be looked at as part of a suppression of the development of ectodermal tissue in general." In its most severe form it results in a total aplasia of the dental lamina and complete absence of teeth. If the ectodermal development is affected later in fetal life, the dental lamina may have formed and produced buds for the enamel organs of the primary teeth. In such cases the second dentition only is suppressed, the entire genetic force of the anlage having been consumed in an effort to produce the primary teeth. In still other cases the aplasia of the dental lamina is incomplete and allows the formation of a few teeth in either the maxilla or mandible. There is, however, generally insufficient vigor to this tissue, and hyperplastic forms result, the teeth having a rudimentary cone-shaped appearance.

In some of the cases reported in the literature there was normal development of the maxillary and mandibular bones. However, a characteristic partial absence of the alveolar ridges of the maxilla and mandible is observed most frequently. The absence of ridges simulates an appearance of underdevelopment of the bone, a condition which does not necessarily maintain, because the lack of an alveolar ridge is the result of the lack of stimulation by erupting teeth.

Ectodermal dysplasia is diagnosed by the association of anodontia with other stigmas, such as hypotrichosis, anhidrosis and asteatosis. The marked dysplasia of the skin, with maldevelopment of its secondary factors, should suggest the diagnosis. A differential diagnosis probably should include a consideration of progeria, hypothyroidism, congenital syphilis, cretinism and peculiar endocrine disturbances.

This present report of a case of ectodermal dysplasia with partial anodontia

2. Thoma, K. H., *Oral Pathology*. St. Louis: C. V. Mosby Company, 1944, p. 156.

should be of interest for two reasons: First, the question has been raised, "Do the face and jaws develop completely in the absence of the primary and permanent teeth?" Second, "What effect does the confinement of young edentulous jaws by artificial dentures have on their normal growth and development?"

Report of Case

History.—The patient, a boy now 10 years of age (Fig. 1), has received his second artificial dentures. The first dentures were inserted at 6 years and 8 months of age, and the second dentures were made three years later when the patient was 9 years and 8 months old.

The child at the age of 3 years and 5 months was referred by his local dentist to the pediatric clinic of the University of Michigan Hospital. The chief complaint, from the mother, was that the child did not perspire, his hair had not grown and only two teeth had erupted.

Fig. 2.—Roentgenogram of the wrist showing the ossification of six carpal centers when patient was 6 years and 8 months old

The mother, aged 28 years, and the father aged 33 years, were in good health. The parents are fifth cousins. At the present time there are three siblings living and well, all normal in physical development. No hereditary or chronic disease of the ectodermal system on either the maternal or paternal side was recalled. Syphilis by name or symptom was denied.

The patient was the first child of the family. Delivery was made by the use of instruments one month prematurely. He weighed 6 pounds and 5 ounces. The child's health during the first few weeks of life was poor, since considerable difficulty was encountered in getting him to nurse. At 3 months of age the patient was taken to a pediatrician because of poor appetite and lack of gain in weight. He sat erect at 10 months, walked at 15 months and talked the first year.

When the child was 1 year of age the parents wondered about the absence of teeth but did not consult a dentist. At 2 years of age he was taken to a dentist, who advised the parents not to worry about the absence of the primary teeth. No roentgenograms were made. At 3 years of age one conical mandibular tooth erupted in the cuspid position. One month later another tooth erupted on the opposite side of the mandible in the cuspid position. Continued eruption was very slow, and the two conical maxillary teeth erupted some months later. Roentgenologic examination of the wrist at 6 years and 8 months of age revealed six carpal centers, which indicates a normal progress of ossification for this age. A roentgenogram is shown in Figure 2.

The patient had "three day" measles at 2 years of age and chicken pox at 3 years. Frequent sore throats were experienced until the tonsils were removed at 5 years of age. Unexplainable episodes of increased temperature were reported to have occurred at 3 years of age but had ceased prior to 6 years of age.

At 6 years of age the child, having started to school and having begun to associate with persons other than those of his immediate family, had become self-conscious because of his lack of teeth. Frequently he refused to go to school. His mother stated that he never had perspired. She remarked further that during the hot days of the summer months he

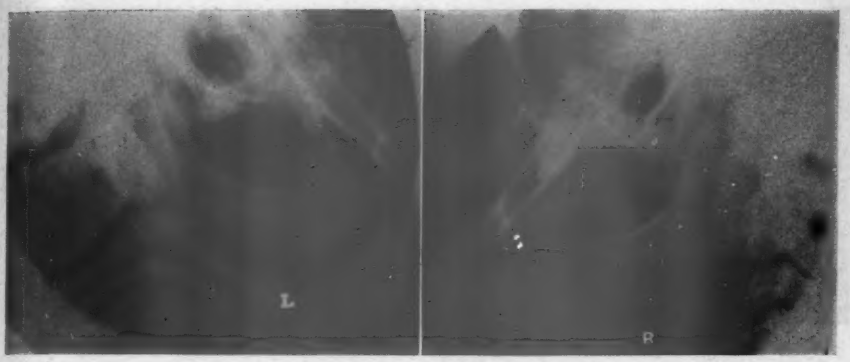

Fig. 3.—Patient, aged 6 years and 8 months. Left: Roentgenogram of left jaw. Right: Roentgenogram of right jaw

was made comfortable by frequent bathing or swimming during the day and on going to bed by use of a moist towel around his body.

At 3 years and 5 months the patient was 39¼ inches tall and weighed 34½ pounds. The chart weight from the Weight-Height-Age-Sex Table, by B. T. Baldwin and T. D. Wood, indicates 34 pounds for a 3 year old child who is 39 inches tall. At 6 years and 8 months of age the patient was 50¼ inches tall and weighed 55¼ pounds. The chart weight indicates 57 pounds. He exhibited a nervous temperament and was active physically but was controlled easily. Blood count and urinalysis indicated a normal condition. The patient appeared intelligent and had made an average record in school.

Examination.—The patient's facial expression and appearance were those of a little old man. The skull was characterized by the prominence of the frontal fossae. The head otherwise was well formed. The scalp hair, of the lanugo type, was a pale yellow-white color and thin in distribution. The individual hairs were of varying lengths, and the hair was sparse but uniformly distributed over the entire scalp. Eyebrows and eyelashes were absent. The lips were thick and when closed and at rest gave the appearance of pouting.

The patient's eyes were sensitive to bright lights, and he wore tinted glasses. Without glasses, he kept his eyelids partly closed to protect his eyes from excessive illumination.

The broad, flat, saddle-like base of the nose was conspicuous. A foul, purulent, crusted green discharge frequently was present in the nares.

The patient possessed only four cone-shaped teeth in the cuspid positions, the absence of other teeth having been confirmed by roentgenologic examination. Roentgenograms of the right and left lateral jaw are shown in Figure 3 and of the upper and lower occlusion, in Figure 4.

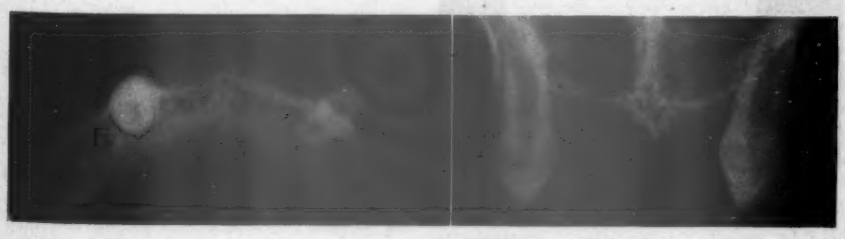

Fig. 4.—Roentgenograms showing occlusal view when the patient was 6 years and 8 months old. Left: Lower Jaw. Right: Upper jaw

Fig. 5.—Left: Gold crowns with full labial acrylic windows. Right: Second dentures in place

The mucous membrane was normal and healthy. The tongue was large. A small amount of saliva gave the mouth the appearance of dryness.

The skin was dry, soft, thin, slightly scaly and atrophic. It tended to be loose and wrinkled. A slightly pigmented area existed around the eyes. There was no evidence of sweat glands. Examination of the chest revealed the absence of nipples. The finger nails were well formed.

Treatment.—Soon after school age the patient was taken to a local dentist who referred him for treatment to the Children's Clinic of the School of Dentistry at the University of Michigan. A staff member undertook the task of making the first dentures when the child was 6 years and 8 months of age. The alveolar ridges, except the areas immediately around the teeth, were flat and thin. The sharp definition of the alveolar mucous membrane presented the clinical appearance of atrophy. The maxilla was broad and flat, and the mucous membrane of the cheeks was continuous with that covering the alveolar ridge. A flabby fibrous pad was present over the area of the tuberosities. The mandible appeared to be of normal size and development for the chronologic age of the patient.

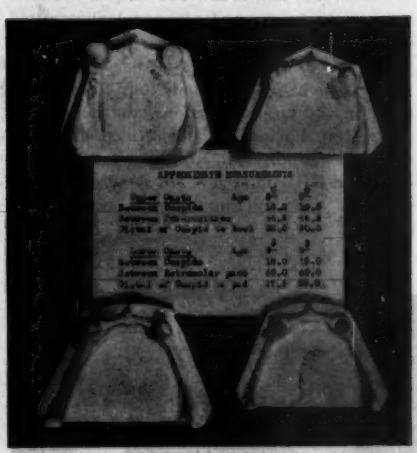

Fig. 6.—Casts of the mouth of the patient at the age of 6 years and 8 months and 9 years and 8 months, respectively. Approximate measurements show an increase in all dimensions

After a thorough oral examination, complete cast, open face gold crowns with full labial silicate cement windows were constructed for the four teeth present. Impressions of the arches were taken, and dentures were constructed with clasps around the four contoured restorations. After the insertion of the dentures, the boy's profile assumed more nearly normal proportions.

The parents were advised of the necessity for periodic observation and adjustment and the possible future need for new dentures after growth of the jaws. It was thought by the staff that the jaws would continue their normal development, but the effect that the dentures would have on normal jaw development remained to be seen. The patient returned to school, and the parents reported that his previous self-consciousness, caused by the missing teeth, had disappeared and that his progress in school was excellent. The patient was observed during the next three

years and several adjustments were made to the clasps of the denture. Two of the crowns were replaced.

Three years after the insertion of the first dentures the patient returned to the Children's Clinic for new dentures. Oral examination and questioning revealed that the dentures were uncomfortable and difficult to keep in his mouth and that the patient had outgrown them. Growth and development appeared to have been normal. Front and profile photographs, which were taken without dentures, are shown in Figure 1.

Since the silicate cement facings of the crowns were somewhat discolored, and the gingival margins of the crowns, which once were under the gum margin, had become exposed by further eruption of the teeth, it was decided that the crowns should be replaced.

One of us (L.W.T.), with the assistance of the staff member who previously had made the dentures, began the construction of the second dentures. The original crowns on the four teeth were removed, and preparations were made for new crowns. Complete cast gold crowns were constructed, and full labial acrylic facings were processed in them (Fig. 5).

Impressions were taken of the jaws for the construction of the second dentures. Casts from these impressions were compared with the previous casts made three years earlier. Measurements were taken in different areas of the two sets of casts. The jaws exhibited growth in all dimensions (Fig. 6).

The first and second dentures are compared in Figure 7. It will be noted that in the first dentures wire clasps were used and that small porcelain incisors were selected for this denture. In the second dentures clasp retention was eliminated, and the upper incisors were processed in acrylic resin. The patient was now past the age when small teeth could be used, and there was not enough space for the usual four incisors. Therefore, three natural looking incisors were carved in wax and processed in acrylic resin to match the shade of the acrylic facings in the cast gold crowns.

Fig. 7.—Above: Upper and lower dentures made for the patient at age of 6 years and 8 months. Below: Dentures made at the age of 9 years and 8 months

The second dentures were inserted and the photograph taken of the patient with the dentures in place is shown in Figure 5, right. The patient and parents again were advised that growth and development of the jaws might continue to take place and that possibly this growth would necessitate the construction of still another set of dentures. The period of time that these dentures can be used with functional satisfaction is unknown. It can be expected that they will function until the next growth spurt of the child, probably at the time of puberty.

Conclusions

Growth and development of the lower face and jaws can take place in the congenital absence of the primary and permanent teeth associated with ectodermal dysplasia. The wearing of artificial dentures during early childhood does not appear to act as an obstruction to the growth and development of the jaws.

▲

Standardization of Nomenclature. —Most of the arguments in nomenclature are over rather trivial matters. Typical of this kind of argument is whether to use "undecane" or "hendecane" for the C_{11} hydrocarbon. What really ought to be done is toss a coin, accept the decision, and be on to more serious problems.—*E. J. Crane, "Chemical Nomenclature," Chemical and Engineering News 26:158, January 19, 1948.*

OSSIFYING PERIAPICAL FIBROMA: ROENTGENOLOGIC STUDIES

LeRoy M. Ennis,* D.D.S., and Harrison M. Berry, Jr.,† D.D.S., Philadelphia

THE dental profession is being confronted daily with the problem of interpreting in the roentgenogram certain radiolucent areas which are found mostly in the apical regions of the six mandibular anterior teeth (Fig. 1-a). These areas have been observed and studied by clinicians for a period of approximately fifteen years, and although at first few instances were noted, we find today that they have become very common. This may be explained in two ways. First, since the areas are symptomatic and reveal their presence only in the roentgenogram, many cases previously were undiscovered; but through the ever increasing use of routine roentgen ray examinations as an aid to, and an integral part of, diagnosis in modern dentistry, the condition is being disclosed more frequently. Second, when the roentgenogram did reveal the presence of these radiolucent areas in their early stages, their appearance was so strikingly similar to that of the dental granuloma that they were often treated as such and their true nature went unrecognized, with the resultant loss of many healthy teeth.

This particular lesion has been called by many names, such as osteitis fibrosa, localized osteitis fibrosa, fibro-osteoma, periapical osteofibroma, cementoma, cementoblastoma, osteofibroma, periapical fibroma and periapical osteofibroma with formation of cementoma. After years of observation of this condition, aided by microscopic studies, we believe the term "ossifying periapical fibroma" best describes the condition (Fig. 1-b).

Occurrence

Ossifying periapical fibroma most often affects women. Stafne[1] reported 70 per cent women, and Zegarelli and Ziskin[2] stated that all of their 50 patients were women. In the latter group the condition was found mostly in Negroes. Zegarelli and Ziskin commented as follows:

> The importance of the 2 to 1 ratio of Negroes to whites found in our group assumes much greater significance when we study the attendance records at the Dental Clinic. During the period from January 1, 1938 to July 1, 1942, the average attendance at the clinic was 82 per cent white and 18 per cent Negro, which is approximately a 4 to 1 ratio of whites to Negroes, making a real difference in the frequency of occurrence of cementomas between black and white races as 8 to 1.

Although the greater number of patients have been between the ages of 35 and 50 years, we have found the condition in patients from 22 to 65 years of age.

It is the purpose of this paper to present an analysis of ossifying periapical fibroma so that roentgenographic evidence of its presence may be interpreted more readily and any uncertainty as to its proper treatment may be eliminated.

The terminology in this article is that authorized by the Committee on Nomenclature and does not necessarily conform with the preferences of the author, for example, cuspid instead of canine and bicuspid instead of premolar.

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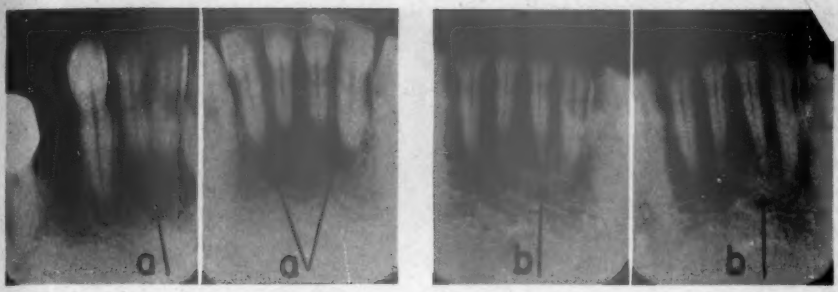

Fig. 1.—Nonpathologic radiolucent areas in apical regions of mandibular incisors (a). These teeth were proved to be vital by all types of vitality testing and by microscopic examination of the pulps of some teeth. Complete ossification of parts of apical regions of mandibular first incisors (b)

Symptoms

As was stated before, the lesion can be discovered only in the roentgenogram, since no clinical symptoms are present. It involves chiefly the mandibular incisors and cuspids and occasionally the bicuspids (Fig. 2-a); these teeth are normal in color and in respect to thermal and electrical vitality tests. They are not sensitive to percussion, and there is no history of pain or discomfort. In the absence of clinical symptoms, the dentist often is somewhat perplexed to discover

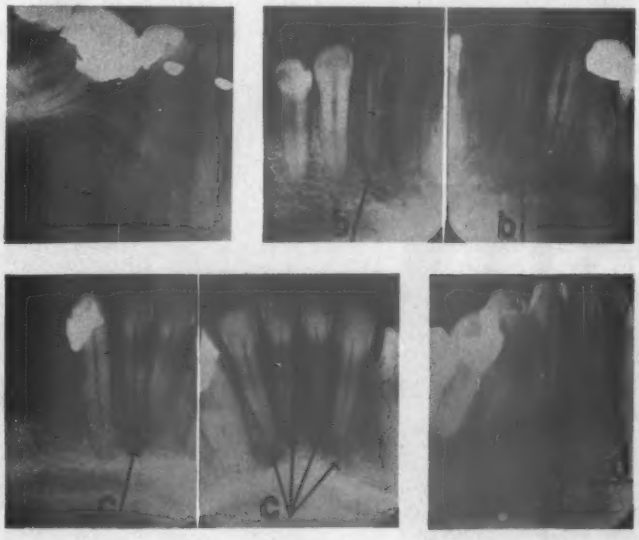

Fig. 2.—Nonpathologic radiolucent area in apical region of left second bicuspid which is undergoing calcification (a). Radiolucent areas in incipient stages in apical regions of vital mandibular right and left second incisors (b). Advanced stage (c) of the aforementioned condition (b). Four incisors are involved. Radiopacity within the radiolucent area in apical region of vital mandibular left cuspid (d), indicating a process of repair within a circumscribed area (e)

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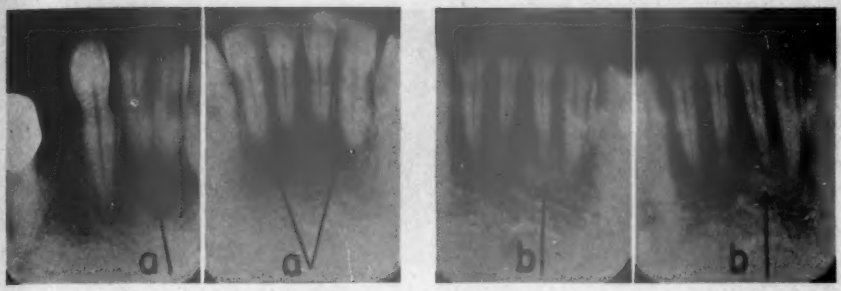

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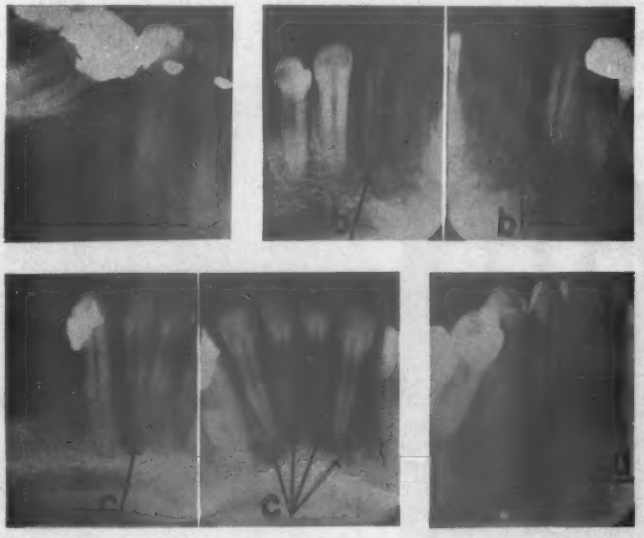

Fig. 2.—Nonpathologic radiolucent area in apical region of left second bicuspid which is undergoing calcification (a). Radiolucent areas in incipient stages in apical regions of vital mandibular right and left second incisors (b). Advanced stage (c) of the aforementioned condition (b). Four incisors are involved. Radiopacity within the radiolucent area in apical region of vital mandibular left cuspid (d), indicating a process of repair within a circumscribed area (e)

Fig. 3.—Radiolucent areas in apical region of four mandibular incisors in prognathous jaw (a). There was no occlusion or history of trauma. Radiopaque area starting at apical portion of root (b). This indicates in all probability that a cementoma would be formed (see Figs. 4 and 5)

in his routine roentgen ray examination a radiolucent area at the apex of one or more of the lower anterior teeth. This area has all of the signs of granuloma (Figs. 2-b and c), unless it has reached the state of beginning calcification, in which case there will be a radiopacity within the area which is indicative of a filling-in or reparative process (Figs. 1-b, 2-d).

A number of questions immediately come to mind: What causes this condition? What is occurring at the apexes of these teeth? Above all, how should the condition be treated? Let us consider these questions carefully.

Cause

No definite cause of ossifying periapical fibroma has been determined, but certain factors definitely may be eliminated. Its radiolucent image on the roentgenogram in its initial stages suggested the possibility that it might have

Fig. 4.—Roentgenogram of section removed from anterior portion of prognathous mandible, revealing more clearly the radiopaque areas (d) within the greater radiolucent areas (c), their origin being from apical margin of teeth and not from periphery of area

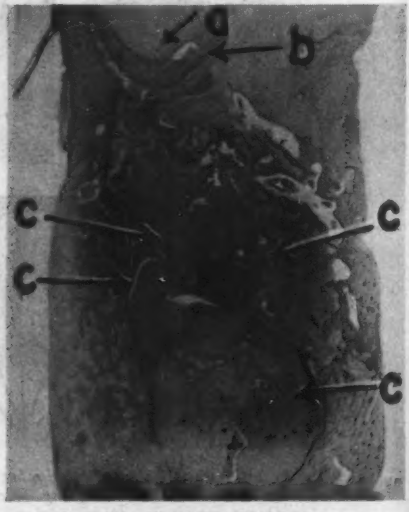

Fig. 5.—Photomicrograph illustrating formation of cementum in area seen in apical region of left first incisor in Figure 3. Root apex (a); dental periosteum (b); cementum (c)

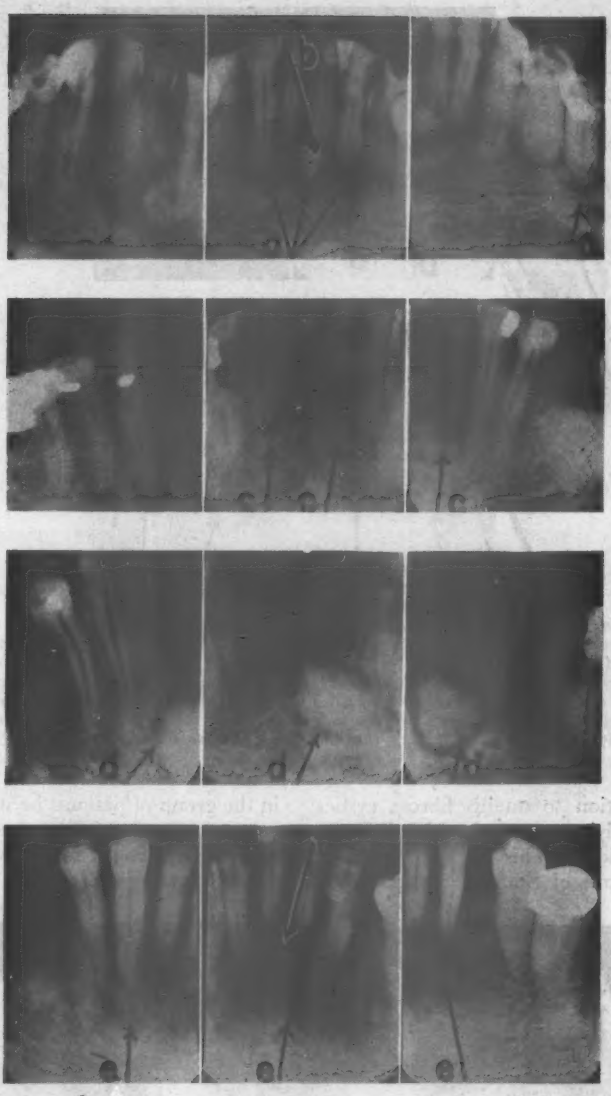

Fig. 6.—Multiple lesions affecting four anterior teeth and bicuspids (a), with formation of a cementum (b) starting from apical region of mandibular right first incisor. Horizontal absorption of alveolar process affecting the six anterior teeth and definite formation of cementum in mandible adjacent to apical portions of mandibular incisors (c). Early loss of mandibular right and left first incisors and left second incisor with large cystic cementoma in apical region of missing mandibular right first incisor and mandibular right second incisor and cuspid (d). Deposition of finely trabeculated bone in apical region of mandibular incisors and left cuspid (e). There is an area of sclerotic bone in apical region of mandibular right first incisor (f)

Fig. 7.—Bone regeneration in apical region of four mandibular incisors (a). It is pronounced in apical region of right and left first incisors and shows a definite regeneration of extra fine trabeculated bone in apical region of left first incisor (b). Definite area of sclerotic bone in apical region of mandibular left first bicuspid (c), showing an overdeposit of calcium which evidently is due to an inflammatory process. The radiolucent area over apex of second bicuspid is the mental foramen (d). Beginning of regeneration of trabeculated bone from periphery of area (e), affecting the mandibular incisors and left cuspid

some relation to osteitis fibrosa cystica, the underlying cause of which is hyperparathyroidism. This has been ruled out by the work of Stafne,[1] who said that in the group of patients he studied "there were no cases of hyperparathyroidism that could account for fibroid degeneration of bone." Zegarelli and Ziskin[2]

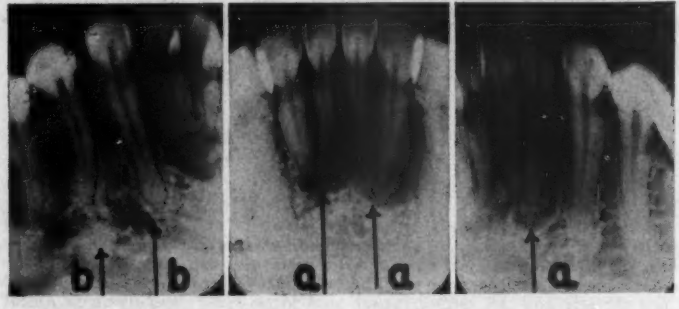

Fig. 8.—Definite reparative process of finely trabeculated bone from lower border of area which involves the four mandibular incisors (a). Note condensation of bone in region of left cuspid and bicuspid (b)

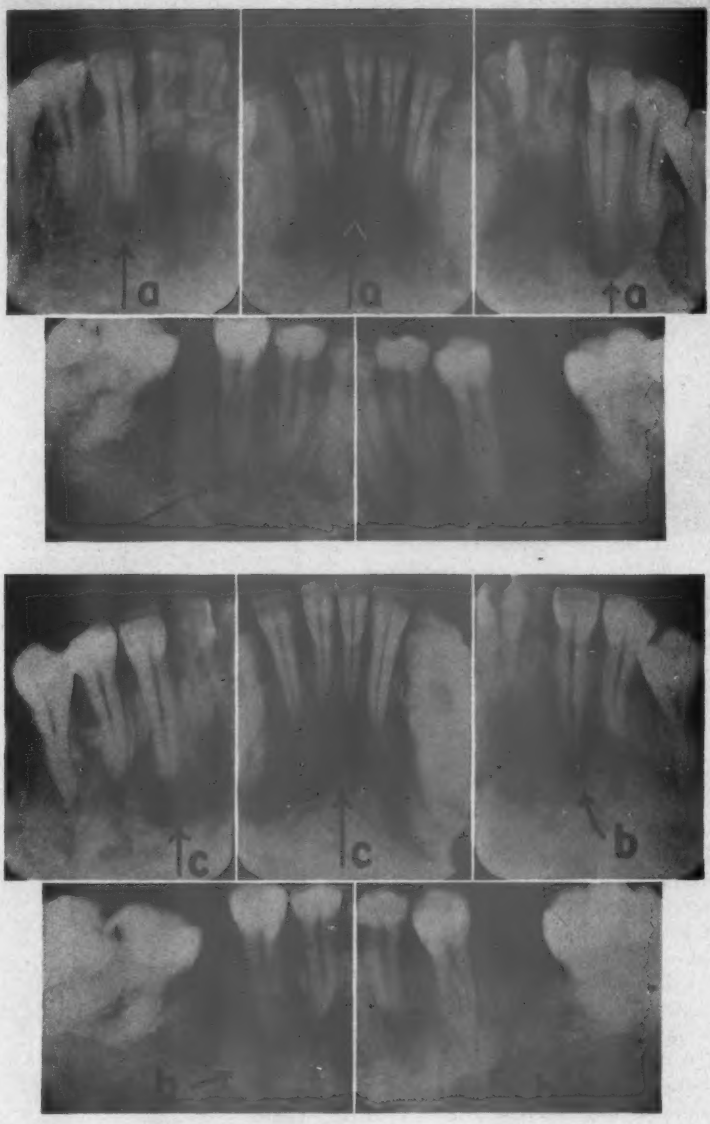

Fig. 9.—Control case, a Negro woman, aged 43 years. Teeth are all vital. Roentgenograms made in May 1946 show radiolucent areas in apical region of mandibular incisors, left cuspid and second bicuspid and mandibular right cuspid and second bicuspid (a). Roentgenograms made in May 1947 show regeneration of bone in region of mandibular right cuspid and bicuspids and mandibular left second bicuspid (b) and greater destruction of bone in region of mandibular incisors and left cuspid (c). It was expected that by 1948 the anterior region would have calcified similar to that seen in (b)

Fig. 10.—Fibrous tumor, commonly called "epulis," between the maxillary first incisors, which has caused considerable separation and distortion of these teeth (a). Radiolucent area originating at apex of right first incisor is area between normal bone and fibroma (b). The fibroma gives a definite indication of calcification, making area (b) look like a fracture

showed that no connection has been found with a present or past history of syphilis or with any other systemic disease. In all cases reported in the literature so far, the medical examinations and histories of the patients have yielded no significant data as to systemic causes.

Trauma to the teeth involved can be eliminated as a local cause, for in our cases none of the patients gave a history of trauma (Fig. 3). Likewise, Zegarelli and Ziskin[2] stated that not one of the 50 patients they studied gave a history of trauma to the involved teeth. They further stated, "The fact that the cementoma occurred as a multiple lesion so often in our group makes the theory of local trauma untenable, especially so since we were unable to discover any alleged traumatic agents" (Figs. 3, 4, 5, 6-a and b).

Characteristics

The condition seems to originate with a proliferation of fibroblasts in the apical region of the dental periosteum, with a resultant rarefaction of bone. The fibrous mass may remain for an indefinite period; then calcification of the fibroma may take place, either in the form of dense, homogeneous cementum (Figs. 3, 6-a-d) or of very finely trabeculated bone (Figs. 1-b, 6-e-f and 7-a-d). According to our roentgenologic observations, if the calcification progresses from the apex of the tooth into the radiolucent fibroma, the end result will be a cementoma (Figs. 3, 6-a-d). If the region is calcified from the periphery of the lesion toward the apex of the tooth, it usually fills in with bone, so that when completely calcified the only evidence of its previous existence may be an area of fine, lacy trabeculae of bone (Figs. 1-b, 6-e-f, 7-e and 8). In other words, after formation of the original fibrous mass, further development may follow one of three courses: 1. It may develop into a cementoma (Figs. 5, 6-a and b). 2. It may remain as a fibroma for an indefinite period (Fig. 1-a). 3. It may be replaced by bone (Figs. 1-b, 6-e and f, 9).

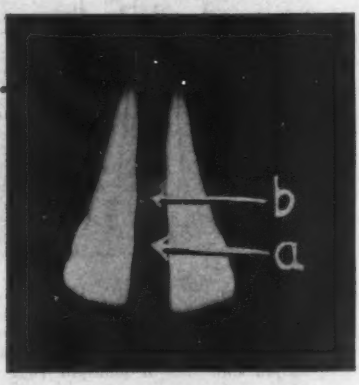

Fig. 11.—Incisors shown in Figure 10, after removal, with fibroma attached to teeth (a) and definite calcification at its base (b)

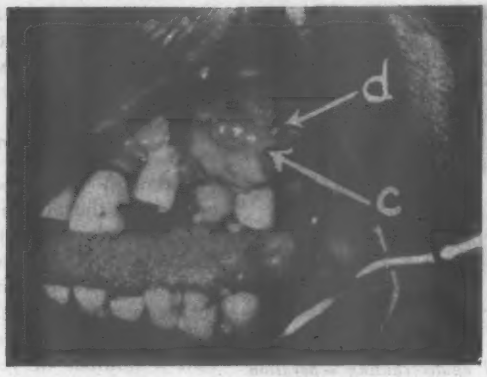

Fig. 12.—Photograph of oral cavity of a Negro, 54 years, showing a large tumor-like mass over area (c). This mass was hard and the tissues over it were thin, the slightest touch causing bleeding, as demonstrated by the small dark spots (d)

It is interesting here to note a similarity between the ossifying periapical fibroma and the epulis. Both are tumors of fibrous tissue, and both arise from the dental periosteum. In the case of the epulis, although many theories have been advanced, no definite cause other than chronic irritation can be assigned to it. This tumor grows from the gingival crevice, becomes covered by a highly vascular epithelium, and in its later stages shows calcification (Figs. 10 and 11).

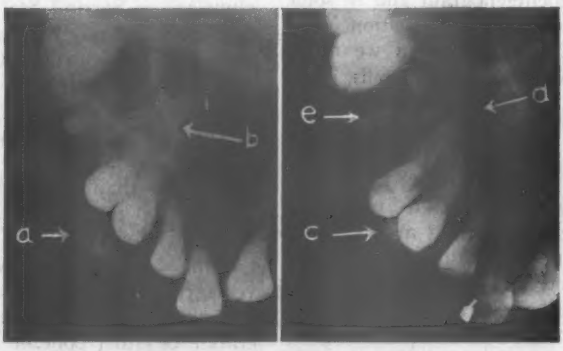

Fig. 13.—Left: Occlusal roentgenogram showing the tumor-like mass in Figure 10 to be bone structure and extending into the vestibule of the mouth from bicuspid region (a). Note the condensation of trabeculated bone extending into maxilla, showing definitely that deposition of calcium salts was in two directions (b). Right: Another view of same calcified fibroma (c), showing a little more clearly the extension of calcium deposits in maxilla (d). The bicuspids were practically ankylosed. Three residual roots of first molar (e), with evidence of cystic regeneration over lingual root

Fig. 14.—Calcified epulis causing separation of mandibular first incisors with apparent growth of bone (f) extending into the body of mandible (g). The remaining fibroid structure over the calcified area, which in this case was about 2 mm. in thickness, is shown (h)

Most patients will seek treatment as soon as they discover the presence of an epulis, and since the generally accepted treatment is extraction of the tooth or teeth involved, many such tumors are removed before calcification has started. In nearly all cases of epulis of long duration we have noted some calcification in the roentgenogram and in some cases almost complete calcification (Figs. 12 and 13). From this fact we might assume that in all cases the epulis, if left long enough, would eventually calcify to some extent, with calcification extending not only into the fibrous tumor, but back into the bone (Fig. 13, right).

It is very interesting to note that neither an epulis starting at the gingival crevice nor an ossifying periapical fibroma affects the vitality of the tooth involved. The similarity between these two lesions suggests the possibility of their being the same condition, the only real difference being that one (epulis) arises from the dental periosteum and grows externally from the gingival crevice (Fig. 14) and the other (ossifying periapical fibroma) arises from the apical region of the dental periosteum and grows at the expense of the periapical bone (Figs. 7-e and 8). The possibility that the two conditions have similar causes is worth at least our consideration and investigation.

Treatment

Although the causes for the development of the ossifying periapical fibroma are unknown, apparently the best course is to leave it alone and to check its progress from time to time with roentgenograms (Figs. 7-e and 8). The lesion usually calcifies rather slowly, so that a number of years may lapse before complete calcification is attained.

Summary

The facts that are known about these radiolucent areas which appear frequently in the roentgenograms of the lower anterior teeth follow:

There are no clinical signs or symptoms.

The patient is totally unaware of the condition until it is revealed by the roentgenogram.

Investigations by such outstanding clinicians as Sorrin,[3] Stafne,[1,4] Zegarelli and Ziskin,[2] and Thoma[5] eliminate as causes such factors as trauma, hyperparathyroidism and present or past history of syphilis.

The condition is more common in women than in men and more common in Negroes than in white persons.

The teeth remain vital, responding to all types of vitality tests.

Clinical observations over a period of years reveal the fact that in the vast majority of these cases there is a regeneration of either bone or cementum.

The proper management is to do nothing except watch the progress of the lesion by means of the roentgenogram.

3. Sorrin, Sidney, Ten-Year Study of a Case of Osteofibrosis. *Am. J. Orthodont. & Oral Surg.* 30:329 (Oral Surg. Sec.) (June) 1944.
4. Stafne, E. C., Periapical Fibroma: Roentgenologic Observations. *J.A.D.A.* 30:688 (May 1) 1943.
5. Thoma, K. H., *Oral Pathology*. St. Louis: C. V. Mosby Co., 1941.

We cannot state with certainty the cause of ossifying periapical fibroma. It is so similar to the epulis in many respects, except for the region of the dental periosteum in which it occurs, that it is reasonable to suspect the same basic type of lesion in both instances. Possibly the same etiology applies to both the epulis and to ossifying periapical fibroma.—*4001 Spruce Street.*

PREPARATION AND IMPRESSION TECHNIC FOR THE FULL PORCELAIN VENEER CROWN

William H. Hagen, D.D.S., Seattle

THE full porcelain veneer crown has been used as a restorative medium for about forty-five years. That such a restoration is highly desirable from a functional as well as from an esthetic point of view is known to the thousands of people who have been recipients of this service and to that small group of dentists who have developed their skills to include baked porcelain.

The profession throughout the years has experienced various waves of enthusiasm regarding the use of the full porcelain veneer crown. Although there have been some changes and a few refinements in the preparation of teeth and the technic of manipulating porcelain during the past years, the basic principles employed in the construction of this restoration are essentially the same.[1]

The jacket crown is used successfully on both anterior and posterior teeth of both arches. The great majority of this work, however, is confined to the upper six anterior teeth. Conditions which influence the use of the jacket crown are: fractures caused by accidents, loss of angles as a result of repeated failures of operative procedures, particular types of erosion, mottled enamel, discoloration, abnormal alignment as well as irregular spacing of teeth, and vertical dimension requirements of reconstruction cases.

The great increase in the use of the commercial laboratory for prosthetic restorations, as well as for crown and bridge prosthesis, has reflected itself in an increased demand for such a service for all phases of baked porcelain. Although the availability of these technicians in the commercial laboratories has stimulated the use of the porcelain veneer crown and although beautiful results have been obtained, such a service, in too many instances, has terminated in a limited functional and esthetic result. Unfortunately, the technician, who may be trained highly in the art of porcelain manipulation, cannot visualize the detailed lingual or labial anatomic structure of the adjacent natural teeth from a plaster or stone model. Further, the interproximal contact and embrasures are all important, if maximum efficiency and function are desired.

Read at the eighty-eighth annual session of the American Dental Association, Boston, August 7, 1947.

Clinical professor of ceramics, University of Washington, School of Dentistry.

1. Le Gro, A. L., *Ceramics in Dentistry*. Second edition. Brooklyn: Dental Items of Interest Publishing Co., 1929.

If the commercial laboratory is to be employed, it is essential that a model with fine detail of the tooth as well as adjacent teeth be presented. Porcelain cannot be adapted to, or correctly finished on, poorly prepared models.

The relatively widespread use of the acrylic veneer in all probability will create a greater demand for the porcelain veneer crown in the coming years. The acrylic veneer has opened a new field of esthetic reproduction in dentistry to hundreds of operators, who previously had declined the responsibility related to porcelain work. Many beautiful crowns that show evidence of careful workmanship have been constructed with acrylic materials. Another factor in favor of the acrylic veneer is the satisfactory color combinations that can be obtained.

The field of plastics in dentistry is not developed fully, since chemists indicate that there are hundreds of possible formulas for this material. The full acrylic veneer, made by present day formulas, will have great difficulty in matching the enviable record which has been established by baked porcelain throughout the years.

The acrylic materials now available for operative and crown and bridge prosthesis have distinct advantages and disadvantages. There is little doubt that a satisfactory formula may be developed later to meet an acceptable standard for such a dental material.[2]

In a careful check of my records over a period of fifteen years, I found that I had less than 2 per cent of known failures in my porcelain restorations. This percentage, without doubt, compares favorably with the percentage of failures in any branch of restorative dentistry.

Preparation of the Tooth

General Considerations.— The degree of perfection attained with a finished porcelain veneer has been described by many writers. It may be stated without controversy that the success or failure of this restoration is in a large measure dependent on the type of preparation on the tooth.

There are those who consider the preparation for a veneer crown a radical procedure. The simplest proof that this concept is incorrect may be demonstrated

2. Klaffenbach, A. O., Anterior Fixed Bridge Prosthesis Including Acrylic Resins. *J.A.D.A.* 34:670 (May 15) 1947.

Fig. 1.—Left: Fractured central incisors. The labial contour and markings must be reproduced accurately in the completed full porcelain veneer crowns. A detailed preoperative record or study model, therefore, is essential. The completed crowns may be seen in Figure 8. Center: Initial cut. Right: Incisal cuts act as a stop-guide when this portion is reduced with a wheel stone

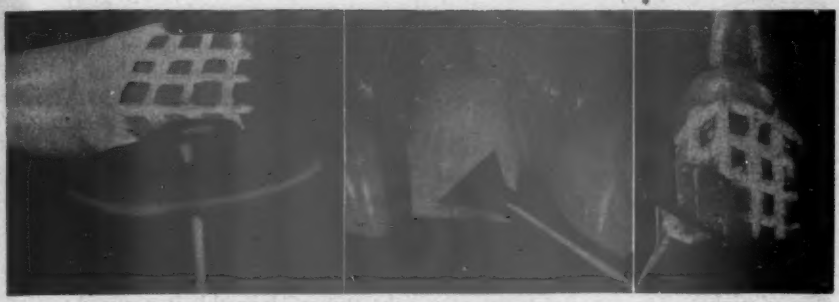

Fig. 2.—Left: Reduction of the labial enamel. A knife-edged stone is used for horizontal cuts (grooves). Center: Removal of remaining squares of labial enamel. Right: Squares in relief

in many hundreds of correctly finished preparations, wherein portions of gold foil, cement, silicate cement, or crown and bridge prosthesis still are retained. These restorations, by necessity, often penetrate farther pulpally than the structure normally lost in a conservative veneer preparation.

The finished preparation should be devoid of any undercuts, and any lost angles should be restored with thin thimble castings, if necessary, to give a symmetric outline. At one time it was considered essential to have a bulk of porcelain which would strengthen a crown. Now it is considered advisable to have a uniform thickness of the porcelain throughout the restoration.

When two or more adjacent teeth are to be prepared, it is advisable to operate on only one tooth at a time. The necessary impressions of the tooth and the region should be taken, and then a temporary crown should be placed for interim care, before the mesial aspect of the next tooth is reduced. It is practically impossible to reproduce accurately the mesial and distal diameter of the tooth unless this procedure is followed.

Roentgenograms.—Although it is practical and desirable at all age levels to have roentgenograms of the involved teeth, it is imperative for young persons. A minimum of two roentgenograms is recommended, one a standard type showing the entire tooth and its surrounding structures and the other limited to the coronal area only. For the coronal picture, the film is placed about 3 mm. above the linguogingival enamel, and the exposure is taken straight through the crown portion. This latter angulation permits one to obtain an accurate picture of the pulp and its extensions.

Cast or Study Model.—The cast or study model may be made quickly by taking a small plaster impression of the labial or buccal surfaces of the teeth. The impression can be poured in low fusing metal and separated immediately. This procedure gives a clearer outline of the surface and anatomic markings than does an impression taken in wax or compound and then reproduced in plaster or stone.

Anesthetic Agent.—A preanesthetic sedative is administered, the dose depending on the age of the patient. Experience has shown that patients are more comfortable and less apprehensive if a preanesthetic sedative is made available. Some minutes later a local anesthetic is given.

Interproximal Incisal Preparation.—The initial cut is made with a diamond point separating disk No. 82 (⅞ inch in diameter, with about 2 mm. of diamond particles around the circumference), accompanied by a constant stream of water which is approximately at body temperature (Fig. 1, left and center).

The smooth metal diamond point sep-

arating disk is selected, rather than the so-called safe-sided carborundum disk, since it is almost impossible to cut or harm the adjacent tooth with the diamond instrument just discussed.

The initial cut or separation is carried just to the gingival crest (not below) on the mesial and distal surfaces. With the same disk, two cuts are made on the incisal edge to mark exactly the amount that the incisal enamel is to be reduced (Fig. 1, right). These two cuts act as a gage or stop-guide, and the remaining portion of the incisal enamel is reduced with a round wheel No. 75 (⅜ inch in diameter) stone.

Labial-Lingual Preparation.—A half inch carborundum disk is used to make a series of cuts or grooves on the labial surface in the direction of the long axis of the tooth. The cuts or grooves are approximately the depth of the labial enamel (Fig. 2, left). The tooth is dried carefully, and the binocular loupes are employed to determine the exact depth which has been attained.

A Miller knife-edged stone is used to cut the horizontal grooves. These steps are repeated on the lingual surface. The squares of enamel which remain can be removed easily by the use of a large No. 48 chisel and with the aid of an assistant who does the malleting (Fig. 2). Orton's enamel cleavers also have been found useful to assist in this step. This procedure helps eliminate friction and uneven cutting depth. Tapered stones are used to remove any unevenness.

It is important that one attain the maximum length in the preparation of the stump, since this is a guard against the possible crescent-shaped fractures which have occurred on the labial or lingual surfaces of many completed porcelain veneer crowns.

Impression Band.—Before cutting or forming of a shoulder is attempted, the impression band should be selected, fitted and festooned carefully. A band that is slightly smaller than appears necessary is preferable. The opening toward the shoulder may be enlarged slightly by stretching or flaring on the tapered end of a small anvil. The band is checked for correct cervical contour, and markings are made on the labial as well as on the mesial and distal surfaces to permit an even distribution of impression material

Fig. 3.—Left: Careful fitting of the band is of great importance. This is accomplished more easily when only the mesial and distal slices have been made and before any attempt has been made at forming the shoulder. Right: Impression band, with the compound stop in place and with a slight flare at the gingival aspect. It should be noted that the compound is about 5 mm. to 10 mm. away from the shoulder outline at all points

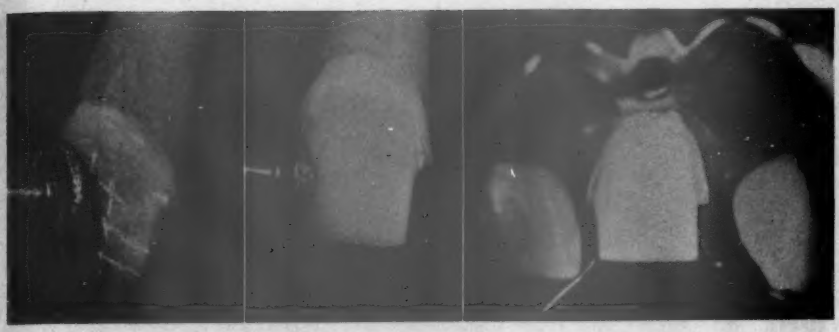

Fig. 4.—Left: Further reduction of enamel on labial and lingual aspects. The surface cuts, which still are evident, are an aid in preventing unnecessary cutting depth and "ditching." The use of small tapered stones frequently results in ditching and irregular cutting. Center: A Bastain stone is used to establish the shoulder outline on the lingual and labial aspects. The smooth side of the stone prevents ditching and undercuts, which often occur at this stage of the preparation. Right: Application of rubber-dam to the region prior to the final completion of the shoulder at the gingival aspect. The mesial and distal slices are 3 to 4 mm. short of the final finishing depth of the gingival shoulder. The gingival tissues will not be injured with this technic

about the preparation (Fig. 3, left).

After the band has been fitted properly, it is approximately half filled with modeling compound. It is placed on the tooth, carried to the correct position on the shoulder outline, cooled and set aside (Fig. 3, right).

Development of Shoulder. — A small flat diamond stone, No. 34 and 35 ($\frac{3}{10}$ inch in diameter), is selected for the angle handpiece, and the shoulder outline is started. This cut is carried in close proximity to the gingival tissue on the labial and lingual aspects (Fig. 4, left).

A Bastain stone (a smooth wheel impregnated only on the cutting edge) is used next to form a more accurate shoulder outline (Fig. 4, center). All of these steps are carried on under a steady stream of water, which is at or slightly more than the body temperature. The water eliminates debris and prevents overheating.

Up to this point there has been no effort made to carry the shoulder under the gingival tissue. It will be assumed, for the purposes of this presentation, that the relation of the gingival tissues to the tooth surfaces is normal. The depth of epithelial attachment is a major consideration, and the epithelial attachment must be examined carefully as well as guarded during all operative procedures in this region. The teeth of some persons will permit the placing of the shoulder slightly higher under the free margin of the gingivae than others, and this added length is desirable, whenever possible, if injury to the attachment will not result.[3]

A rubber-dam is applied, and a clamp is placed and blocked with compound. This enables the operator to have a clear field of vision and to finish the shoulder, as in any fine cavity preparation (Fig. 4, right).

The shoulder is established with a No. 56 or 57 contra-angle smooth fissure bur (spiral type), which is held in the straight handpiece (Fig. 5, left). This gives a grip on the bur almost like an engraving tool, and with light even strokes the proper depth and outline can be secured quickly and evenly. An end cutting bur is run lightly around the

3. Clark, E. B., Requirements of the Jacket Crown. *J.A.D.A.* 26:355 (March) 1939.

Fig. 5.—Left: A fissure bur is used in the straight handpiece (held by close grip) for the development of the outline of the shoulder. Center: A chisel is employed for the toilet and finish of the shoulder. It provides a sharp and definite outline. Right: A small rubber cup, containing a wet mixture of pumice, gives a smooth completed preparation

whole shoulder, and the finish as well as the toilet of the shoulder is accomplished with a No. 83 bin-angle chisel. Only a small amount of cutting with the disk is necessary (Fig. 5, center).

For the final finish, the use of a wet mixture of pumice and a small rubber prophylactic cup is recommended. This procedure takes less than a minute and gives the preparation a smoothness one cannot secure in any other manner. The impression and die will prove this (Fig. 5, right).

Grubb,[4] discussing the preparation for a jacket crown, said:

> The prepared tooth that will give the maximum support to a porcelain jacket crown will conform closely in outline to the natural form of the dentin. Its proximal surfaces will be almost parallel, the variations from the parallel being sufficient only to permit the removal of the impression without distortion.

Figure 6 shows a correctly finished preparation and methods of reconstruc-

4. Grubb, H. D., The Porcelain Jacket Crown. *New York J. Den.* 17:7 (January) 1947.

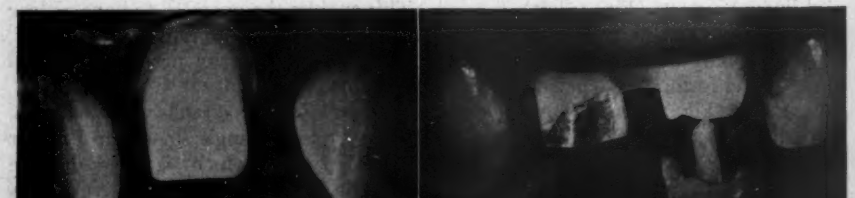

Fig. 6.—Left: The finished preparation. Right: Methods of reproducing correct outline form of the preparations for severely fractured central incisors. The right central incisor shows the usual method of reconstruction by the use of the gold thimble. The left central incisor illustrates the use of the acrylic post and tip, which more nearly reproduces the natural color of dentin and which permits a more favorable esthetic result in the completed porcelain veneer restoration

tion when excessive tooth substance has been lost.

Impression

The preparation is coated with a mixture of phenol and light mineral oil as a lubricant. The band, which has been formed and festooned previously, and has the compound stop in place within, now is ready for use. A hot instrument is used to make several small undercuts in the compound. The remainder of the band is filled with a wax-impregnated graphite, which is rather soft and very low fusing. Care should be used not to overheat this material. The band is placed on the tooth and pressed carefully into position. It will not pass farther than the gingival measurement obtained previously, since the graphite wax is not warm enough to change the temperature of the compound which was placed as the stop. This wax takes a smooth accurate impression of the shoulder, comes free without apparent breakage and will not distort or injure the investing tissues of the tooth. The method of packing the gum tissue back for the purpose of finishing the shoulder or cementation is not recommended.

The rubber-dam having been removed, the impression is washed by a cool atomizer spray and dried with cool air. This impression is plated with copper. Satisfactory dies can be made from amalgam or silicate cement, but these cannot be used with the impression technic previously described.

A piece of pink baseplate wax, about ⅝ inch wide, is warmed and rolled into a cylindric shape. This cylinder should extend about 1 mm. in width on both the mesial and distal sides of the tooth. A hot spatula is inserted in one end of the cylinder, about the depth of the tooth preparation. The wax is pressed over the preparation and is held firmly and chilled (Fig. 7, left). This technic confines the wax, and it takes a good outline of the shoulder as well as of the mesial and distal aspects of the adjacent teeth. Next, model plaster, with an accelerator, is used to take the impression of the surrounding teeth and tissue, and the wax cylinder is removed with the plaster (Fig. 7, right). The prepared tooth model can be inserted easily into the wax cylinder, since a good outline of the cavosurface angle of the preparation usually is visible (Fig. 8).

Fig. 7.—Left: A rolled wax cylinder, ⅝ inch wide, is heated quickly by several quick thrusts of a hot spatula. Right: Wax cylinder is pressed carefully and firmly to place around preparation

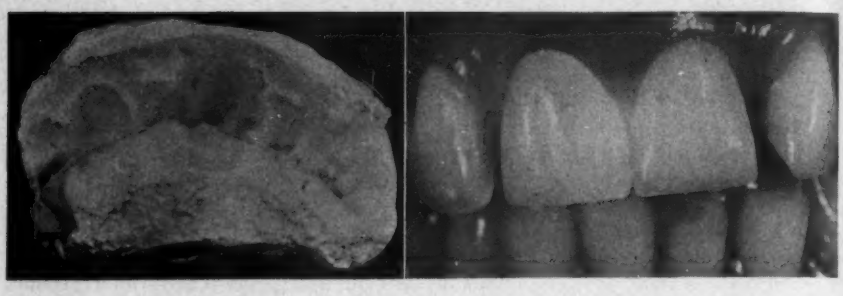

Fig. 8.—Left: Plaster impression with a wax core in place. Note that the wax has been confined to the mesial and distal aspects and cavosurface outline of the preparation. The wax and the outline are seen easily, and this facilitates the correct placement of the die. Right: Completed full porcelain veneer crowns. Refer to Figure 1 for the original condition of the teeth

Summary

The availability of the ceramic laboratory technician in the commercial laboratories has increased the demand for such service by the dentist. However, in too many instances such service has terminated in a limited functional and esthetic result.

The plastics (acrylic resin) in the field of dentistry are not developed fully, and today they have a limited use. The full porcelain veneer crown is the restoration of choice.

Administration of a preanesthetic sedative as well as of an anesthetic is desirable and practical in the preparation of a tooth for a full porcelain veneer crown.

The success of the full porcelain veneer crown is in a large measure dependent on a well defined preparation of the tooth. The development of a proper shoulder in the gingival region is imperative for a successful preparation.

An impression taken by means of compound and graphite wax is accurate and produces a detailed working model.—*821 Medical and Dental Building.*

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Chemical-Biological Coordination Center.—Every year chemists prepare thousands of new compounds, most of which prove unsuited to the immediate purposes for which they were made and accordingly are shelved and forgotten. There is always the possibility, however, that some of them might be extremely useful for other unexpected purposes. Thus DDT and sulfanilamide were both prepared and discarded decades before their extraordinary biological powers were accidentally discovered. To minimize this kind of oversight, the National Research Council has organized a Chemical-Biological Coordination Center in Washington. With the aid of funds from the Army, Navy, National Cancer Institute and American Cancer Society, the Center is preparing a catalogue of the physical and chemical properties of old and new chemical compounds.—*"Chemical Center," Scientific American, October 1948, p. 25.*

THE BLOOD DYSCRASIAS AND THEIR EFFECT ON THE PRACTICE OF DENTISTRY

Tolar N. Hamblen, D.D.S., M.S.D., Houston, Texas

TODAY the science of dentistry has progressed far toward its rightful place as a branch of the healing art. The responsibility of the dentist is one of health service. No longer is he limited to the technical application of substitutes for parts of dental tissues already lost or destroyed by disease, nor should the oral diagnostician harbor the delusion that his field is limited by precedent to one circumscribed area. Rather, the field within the province of the oral diagnostician and surgeon is the entire oral cavity, from and including the lips anteriorly to the anterior pillars of the fauces posteriorly, including the bony framework of the oral cavity and the temporomandibular joint, and all the complicated multitude of conditions affecting these structures.

No longer is the completely erroneous concept that the mouth is an entity apart from the rest of the body adhered to, and it is an established and recognized fact that many systemic disease processes manifest their first subjective symptoms as oral lesions. This is particularly true of the blood dyscrasias, and it is because of this fact that the dentist is the first person consulted by the patient in these cases. It is of cardinal importance that the oral manifestations of blood dyscrasias and their true significance be recognized early, that no local treatment be instituted and that the patient be placed in the hands of a skilled internist. With the clinical knowledge and the technical and laboratory diagnostic aids available, there is little excuse for failure to diagnose the blood dyscrasias speedily and correctly; it is upon this procedure that the life of the patient may depend.

It may be said that the dentist in general practice and particularly the oral diagnostician and surgeon should make himself thoroughly cognizant of his field, its anatomy, physiology and pathology, as his duty to his patients, his profession and himself.

Historical Material

Diseases known today as the blood dyscrasias were recognized as clinical entities by Hippocrates and others associated with the antiquity of medicine, mention being made in the ancient *Palestinian Talmud* of the "bleeding disease" (hemophilia). However, because of the paucity of knowledge concerning the blood and its constituents and formation, early ideas of the cause and treatment were necessarily in error.

Perhaps the first differentiation of a blood dyscrasia as a clinical entity was made by Werlhof in 1731, at which time he segregated the condition now termed thrombocytopenic purpura from the other hemorrhagic diseases.

In 1803, Otto published a classic on hemophilia which immediately brought the interest of the profession to bear upon this condition.

These advancements in medical knowledge were followed before the middle of the nineteenth century by the great work

of Combe (1822) and of Addison (1849) describing pernicious anemia, and that of Bennett and Virchow (1845) who described the enlarged spleen observed at necropsy and the increased leukocyte counts of patients who died of leukemia, the clinical entity of which was recognized by Fuller (1846).

The latest etiologic discovery was made by Kracke in 1932, when he proved the culpability of those drugs which contain the modified benzene ring, of which group aminopyrine is the most notorious example, in the production of agranulocytosis.

The first notable advance in our understanding of the blood dyscrasias was made by Ehrlich and may be said to begin with his classification of the blood cells. Since the time of Ehrlich, amazing strides have been made in the knowledge of the blood, its histology, its embryology and its physiology, and the science of hematology has progressed to a point closely approaching perfection.

Physiology of Blood

Blood is a highly complex fluid tissue possessing a specific gravity which varies from 1.050 to 1.060 and a viscosity five to six times as great as that of water.[1] Whole blood is composed of a fluid portion, the plasma, and of cellular elements or corpuscles which are suspended in the plasma. It is the latter component, the cellular elements, which are involved in the blood dyscrasias to be considered, and therefore a brief survey of the histogenesis and the functions of these elements is perhaps propitious, in order that a more comprehensive explanation of the blood dyscrasias may be assured.

It is generally agreed that all blood cells are ultimately derived from identical primitive mesenchymal cells, but as is stated by Wiggers:[2]

> The questions remain unsettled whether throughout life all types of blood cells continue to be derived from a common pluripotential stem-cell, or whether, for each type of cell, specific antecedent cells are formed during embryological development, which do not possess the power of producing other types.

The solving of this problem may provide an extremely important link in the chain of etiologic processes in those dyscrasias where etiologically significant evidence is sparse or entirely lacking. The blood cellular elements are divided into red corpuscles or erythrocytes, white corpuscles or leukocytes, and blood platelets or thrombocytes; and the blood dyscrasias may be roughly divided according to the particular cellular element affected.

Diseases of Red Blood Cells

Normal erythrocytes have the shape of a biconcave disk, which gives the utmost surface area. This anatomic characteristic makes these cells much more suitable for the carrying out of their functions of transporting oxygen and nourishment to the cells, and carbon dioxide and waste products of metabolism from the cells. The efficiency of the erythrocyte depends on its content of hemoglobin, the iron-bearing compound protein which is the red coloring matter contained in the erythrocytes. A deficiency of this material within the cells, hypochromia, or the presence of an abnormal number of immature macrocytic erythrocytes which contain little or no hemoglobin, greatly decreases the efficiency of the erythrocytic factor as a whole, and the symptoms of anemia are manifest.

The development of the erythrocytes, erythropoiesis, takes place, according to Sabin,[3,4] within the sinus capillaries of the red bone marrow which are temporarily closed to the circulation. The

1. Best, C. H., and Taylor, N. B., *The Physiological Basis of Medical Practice*. Baltimore: Williams and Wilkins Company, 1945.
2. Wiggers, C. J., *Physiology in Health and Disease*. Philadelphia: Lea and Febiger, 1944.
3. Sabin, F. R., On the Origin of the Cells of the Blood. *Physiol. Rev.* 2:38 (January) 1922.
4. Sabin, F. R., Bone Marrow. *Physiol. Rev.* 8: 191 (April) 1928.

red cells develop from undifferentiated endothelial cells through a series of changes which may be enumerated as follows:

1. Megaloblasts. These are relatively large, colorless, basophilic nucleated cells which, according to some investigators, are not identical with the megaloblasts of pernicious anemia, and therefore the term is confusing. These cells give rise to

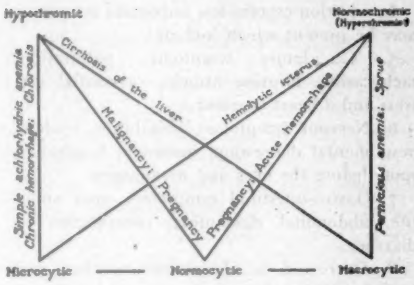
2. Erythroblasts (early and late stages), which contain fewer mitochondria and gradually lose their basophilic properties, acquire hemoglobin and are thus transformed into

3. Normoblasts, which resemble the mature erythrocyte in hemoglobin content and size but still possess a nucleus. On loss of the nucleus a normoblast becomes a

4. Reticulocyte, which is an erythrocyte whose youth is indicated by a fine basophilic reticulation of the cytoplasm. This cell may be said to represent roughly the terminal stage of normal erythropoiesis in the bone marrow. When sufficient concentrations of these cells are obtained, the capillaries open up and showers of reticulocytes enter the blood stream where, by further aging and increased eosinophilia and oxygen and carbon dioxide combining powers,

5. Mature erythrocytes are formed.

The development of the erythrocytes involves three processes: the formation of the stroma, the synthesis of hemoglobin, and the differentiation of the cells as has been outlined. In healthy marrow, red blood cells lost as a result of use in normal physiologic processes are replaced almost entirely by division and redivision of the later forms (normoblasts and late erythroblasts) and only to an almost negligible extent through multiplication and maturation of the primitive forms. When these normal processes of red cell formation are disturbed a blood dyscrasia will develop which may take the form of an anemia



Classification of the anemias (from Todd and Sanford, Clinical Diagnosis by Laboratory Methods. Philadelphia: W. B. Saunders, 1943)

(deficiency of erythrocytes and lowered hemoglobin) or of an erythemia (increased number of red blood cells).

The Anemias

Anemia has been the subject of the greatest amount of research in hematology, and volumes upon volumes have been written concerning the etiology, diagnosis, prognosis and treatment of the types of anemia known to exist and the many factors relating to them. It is much beyond the scope of this paper to undertake any semblance of a complete discussion of the anemias, and in truth such a discussion would be, for the most part, irrelevant and unnecessary. However, a simple diagram of conditions usually producing anemias and the type of anemia produced has been included.

All anemias, regardless of cause, have the same general symptoms which may be manifested with more or less severity. These are listed by Comroe, Collins and Crane[5] as follows:

1. Pallor (seen especially in the lips, fingernails, conjunctivae, tongue, and mucosa of the mouth).

2. Dyspnea on exertion (breathlessness).

3. Drowsiness or vertigo.

4. Edema of the extremities (if an anemia of any severity is present).

5. Comroe, B. I.; Collins, L. H., Jr., and Crane M. P., *Internal Medicine in Dental Practice.* Philadelphia: Lea and Febiger, 1942.

In addition certain less important symptoms may be present which include:

5. Circulatory symptoms: palpitation, tachycardia, fainting attacks, precordial distress and a heart murmur.

6. Nervous symptoms: irritability, restlessness, mental depression, insomnia, headaches, spots before the eyes and nervousness.

7. Gastro-intestinal symptoms: poor appetite, abdominal discomfort, constipation or diarrhea.

8. Decreased or absent menstruation and loss of sexual desires.

9. A low-grade fever.

In addition to these general symptoms, variations in the blood picture and certain clinical symptoms are presented which are peculiar to, and characteristic of some specific types of, these dyscrasias. Several of these bear a relation to dentistry of sufficient significance to merit some discussion; namely, pernicious or Addisonian anemia, hypochromic microcytic anemia and aplastic anemia.

Pernicious (Addisonian) Anemia

Probably the most constant oral finding in cases of pernicious anemia is the characteristic glossitis which has been termed Moeller's glossitis and Hunter's tongue. William Hunter, in fact, after a study of some 76 cases of pernicious anemia and its oral manifestations, concluded that the disease was the result of oral sepsis, a supposition which it was never possible to prove; however, it may be stated with fair certainty that the tongue symptoms are most often the first observed clinical signs of pernicious anemia. The tongue early becomes hypersensitive and tender, the severity gradually progressing until that point is reached where the mastication and deglutition of even the softest food is practically an intolerable procedure.[6] Anday[7] states that the inflamed tongue is not coated but is red, raw and bulky owing to the damaged covering epithelium, inflammatory hyperemia, edema and infiltration with inflammatory cells. The most marked manifestations, as a general rule, involve the sides and tip of the tongue wherein vesicle and small ulcer formation may be observed. The beefy tongue stands out in sharp contrast to the extreme pallor of the surrounding mucosa, which is in harmony with the bloodless appearance of the skin (usually a yellowish tint is manifested) and conjunctivae. These tongue symptoms may be manifested by other conditions such as other types of macrocytic anemia, gastric carcinoma and frequently microcytic anemias, but they are confined to the deficiency anemias. Castle[8] has stated, "In certain anemias, notably pernicious anemia and its relatives, one may observe that the tongue is sore (glossitis) or the tongue may be smooth, red or inflamed, especially the tip or sides."

Gingival and periodontal conditions often are noticed in cases of pernicious anemia, and often these are of such severity as to result in early loss of the teeth. No definite conclusion can be reached as yet concerning anemia as an etiologic factor in the production of periodontal disease, other than one of assumed importance which stems from the lowered resistance of the oral tissues to ordinarily innocuous external irritation.

The blood picture in cases of pernicious anemia is diagnostically characteristic. There is a great diminution in the number of red blood cells (the count may be as low as 1,000,000) with a less marked reduction in hemoglobin, resulting in a color index above unity. The red blood cells are variable and irregular in size and in shape, conditions known as anisocytosis and poikilocytosis, respectively. The erythrocytes are predominantly large (macrocytic) and show in-

6. Riesman, David, Soreness of the Tongue as an Initial Symptom of Pernicious Anemia. *D. Cosmos* 65: 1015 (September) 1923.

7. Anday, G. J., Blood Dyscrasias and Their Relationship to the Dentist. *J.A.D.A.* 31:1458 (November 1) 1944.

8. Castle, W. B., Oral Manifestations of Blood Dyscrasias. *Am. J. Orthodont. & Oral Surg.* (oral surg. section). 27:523 (September) 1941.

creased polychromatophilia. The young forms such as erythroblasts and megaloblasts are sometimes present, and in most cases a more or less marked leukopenia and thrombocytopenia exist.[9]

In the great majority of cases a tentative diagnosis of pernicious anemia may be made, or at least a strong impression that this condition is present may be obtained, from the clinical picture; however, the exact diagnosis may be made when the clinical and laboratory findings are complementary. There are some conditions, such as sprue and diphyllobothriasis, in which the clinical and blood pictures are similar to those presented by pernicious anemia. In the case of sprue, however, achlorhydria is not often found. Diarrhea (pale, frothy, fatty, offensive stools) and recurrent stomatitis constitute the principal and usually differentiating symptoms. In the case of diphyllobothriasis the finding of segments of the parasite (a type of tapeworm) in the stools will identify the culpable agent.

Any emotional upset such as that induced by fear of dental operations may seriously lower the erythrocyte count and precipitate a grave crisis, resulting even in the death of a patient suffering from pernicious anemia. Any surgical procedures such as tooth extractions must be undertaken with extreme care, paying strict attention to changes in the patient's blood picture. Cases have been reported wherein tooth extraction in cases of pernicious anemia resulted in death.[10] It is advisable to abstain from any surgical operations; however, when such a procedure is unavoidable, operation may be undertaken with a fair degree of safety if the patient is adequately treated with crude liver extract and the operation is executed carefully and with a minimum of trauma.

9. Kracke, R. R., *Diseases of the Blood and Atlas of Hematology*. Philadelphia: J. B. Lippincott Company, 1941.

10. Fink, E. B., The Oral Manifestations of the Blood Dyscrasias. *Bur* 36:15 (March) 1936.

Hypochromic Microcytic Anemia

Hypochromic microcytic anemia is essentially the result of an iron deficiency which causes a decrease of hemoglobin formation; the erythrocytes themselves usually are slightly smaller in size but normal or only slightly reduced in number. As a result of the deficiency of hemoglobin the color index is lowered, the amount of this deviation usually indicating the severity of the anemia. The cause of this condition is still a subject of dispute among investigators, and probably a number of factors play a part. The causes most often mentioned are achlorhydria or hypochlorhydria, deficient iron intake (usually coupled with hypochlorhydria) and chronic hemorrhage, often as a result of prolonged menstrual bleeding.

The symptoms manifested in the oral cavity are approximately the same as for other anemias. The lips, tongue and oral mucosa are pale and appear to be bloodless. In addition, the tongue has a slick, glazed appearance as a result of atrophy of the papillae and is often sensitive, with a flabby, edematous appearance.

There is a definite predisposition to infection and ulceration, and therefore all dental work should be undertaken with extreme caution. Cases have been known in which tooth extraction was followed by septicemia and death.[11] It is truly fortunate that these conditions are so amenable to iron therapy. Almost immediate resolution of symptoms and return of the blood picture to nearly normal occur on institution of such treatment; therefore, in the majority of cases surgical measures can be postponed until after the condition is under adequate control.

Chlorosis

A now uncommon form of anemia seen in young girls is known as chlorosis. The hemoglobin is greatly reduced and

11. Thoma, K. H., *Oral Pathology*. St. Louis: C. V. Mosby Company, 1944.

this fact together with the slight reduction in erythrocyte count results in a grealty lowered color index. The condition is accompanied by the usual symptoms of anemia, and the gingival margin has a bluish or reddish-yellow tinge with an accompanying tendency to periodontal involvement. The blood picture demonstrates an anemia of the microcytic hypochromic type with an increase in the number of blood platelets. The latter fact results in an increased rate of blood coagulation. Chlorosis is an iron deficiency anemia and responds readily to iron therapy.

Aplastic Anemia

Aplastic anemia develops when for some reason the bone marrow is dealt such a stunning blow that it never recovers, and there results an extreme anemia, leukopenia and thrombocytopenia. Blood destruction continues at the normal rate, but there is no attempt on the part of the aplastic marrow to replace the loss. However, the blood picture may remain strangely normal, without the appearance of young blood cells as is the case with the other anemias. Aplastic anemia may be divided into primary and secondary types.

Primary aplastic anemia is of unknown cause. It is rapidly and progressively fatal in a matter of a few weeks or at most some months. Purpuric hemorrhages are common as the result of the extreme thrombocytopenia. The principal pathologic criterion is aplasia of the bone marrow, which shows little or no evidence of hyperplasia and is composed mainly of large globules of fat.[12]

Secondary aplastic anemia may occur as a terminal stage of pernicious anemia or as a result of long continued toxic conditions produced by such drugs as benzene or arsenic, exposure to roentgen rays or radium and long continued toxic infections. Mouth symptoms are usually rare; however, some cases have been reported in which there was acute ulcerous stomatitis and glossitis.[5]

The prognosis is extremely poor, and dental treatment or any surgical procedure, if it does not precipitate the patient's death, will only add to the suffering in the few remaining weeks of life. There is no successful treatment known; however, some extension of life may be accomplished through repeated transfusion.

There is a type of secondary aplastic anemia that need only be mentioned. It is a relatively rare condition termed myelophthisic anemia, and it results from tumor formation in, or encroachment on, the bone marrow, which is gradually replaced by the tumor mass. The tumor may be primary and originate within the bone marrow, as in the case of multiple myeloma or Ewing's tumor, or it may be metastatic from a carcinoma, the primary growth being located in another region such as the breast, prostate or thyroid gland.[12]

Erythemia

Erythemia is a primary increase in the red blood cells, irrespective of the needs of the body, the increase in number of erythrocytes varying from 2,000,000 to 5,000,000 in each cubic millimeter. In addition, there is an increase in blood volume, a true plethora, so that the total red cell count is much greater than that indicated.

True erythemia, also known as polycythemia vera, must be differentiated from erythrocytosis, which results from insufficient oxygenation and is produced by chronic heart and pulmonary diseases and by long continued residence at high altitudes.

Polycythemia vera, according to Best and Taylor,[1] appears to be primarily centered in the red bone marrow, which is greatly increased in amount and hyperplastic, extending into the shafts of the bones to displace the fatty marrow. The

12. Boyd, William, *A Textbook of Pathology*. Philadelphia: Lea and Febiger, 1943.

sinus areas are packed with normoblasts and mature erythrocytes, the megaloblasts and other earlier types being absent or extremely scarce.

The cause of erythemia is still vague, although numerous hypotheses have been advanced. These vary from consideration of a neoplastic process of the bone marrow[12] and of hypofunction of the diencephalon to the later and perhaps most feasible view that the condition results from anoxemia of the bone marrow.[13]

Polycythemia vera is a relatively rare chronic dyscrasia, which usually occurs in the fifth decade of life. The general symptoms as well as the oral symptoms are referable to the extreme overloading of the entire circulatory system with blood. The general symptoms include enlargement of the spleen, weakness, headache and vertigo. There is a history of venous and arterial thrombosis, the characteristic blood picture and evidence of hyperplasia of the red cells on examination of a biopsy specimen of sternal bone marrow.[5, 14]

The oral symptoms are in keeping with the circulatory congestion, and the purplish red, cyanotic color of the face and lips is also seen in the oral mucosa and the tongue, which usually is coated heavily and often is fissured. Frequent extensive hemorrhage, most often from the gingival tissues as a result of the slightest trauma, often is observed. The hemorrhage also may occur spontaneously.

The diagnosis may be made tentatively from the subjective and objective symptoms and verified by blood examination and sternal puncture.

The prognosis is poor since there seems to be no apparent cure; however, some persons have lived ten or more years with this condition. Numerous measures have been suggested for treatment of polycythemia vera, among which may be mentioned irradiation, repeated venesection and the administration of erythrocytic poisons such as phenylhydrazine or acetylphenylhydrazine. Recently radioactive phosphorus has been used with seemingly excellent results.

Since oral surgical procedures may result in excessive hemorrhage, the use of such treatment is limited. Although therapeutic bloodletting often is undertaken, such a procedure is conducted only under circumstances which are at all times within the complete control of the operator.

Folic Acid in Treatment of Anemia

Folic acid was so named by Mitchell, Snell and Williams, who obtained it from spinach. They also demonstrated that it could be derived from liver, yeast, kidney, mushrooms and many green leaves including grass.[15]

There has been a great amount of research and clinical work conducted wherein folic acid has been utilized in the treatment of blood dyscrasias in laboratory animals[16] and in human subjects. Spies[17] did some outstanding work in which 45 patients were treated with folic acid. In this group of cases, which included patients with macrocytic anemias of nutritional origin as well as anemias of sprue, pellagra and pregnancy, and pernicious anemias in relapse, excellent results were obtained. The same treatment failed in patients with the anemias of leukemia, aplastic anemias and iron deficiency anemias.

A complete discussion of the work done with folic acid in the treatment of the anemias is not possible in this paper; however, the latest findings concerning the use of folic acid have been summar-

13. Pepper, O. H. P., A Review of the Secondary Anemias. *California & West. Med.* 34:233 (April); 335 (May) 1931.

14. Henny, F. A., Significance of Blood Dyscrasia in Oral Surgery. *J. Oral Surg.* 2:106 (April) 1944.

15. Mitchell, H. K.; Snell, E. E., and Williams, R. J., The Concentration of "Folic Acid." *J. Am. Chem. Soc.* 63:2284 (August) 1941.

16. Daft, F. S., and Sebrell, W. H., The Successful Treatment of Granulocytopenia and Leukopenia in Rats With Crystalline Folic Acid. *Pub. Health Rep.* 58:1548 (October 15) 1943.

17. Spies, T. D., Effect of Folic Acid on Persons With Macrocytic Anemia in Relapse. *J.A.M.A.* 130: 474 (February 23) 1946.

ized by Kaufman and Schwager.[18] Their summary, which follows, seems to express the generally held opinion of the majority of investigators at the present time.

1. The treatment of pernicious (Addisonian) anemia by folic acid (folvite) or vitamin Bc has been found to be efficacious in primary so-called virgin untreated cases of pernicious anemia as well as in relapse of old previously-treated cases with liver therapy.

2. Folic acid therapy by oral administration is well tolerated. It is prompt, painless and unexacting and gives evidence of its effectiveness by early reticulocytosis and subjective and objective improvement.

3. The prompt improvement needs comparatively large dosage, 20 to 40 mgm. daily. The maintenance dose seems to be small, 5 to 15 mgm. daily, at present, but it may be less. In the light of our present knowledge this treatment is no guarantee against relapses if the maintenance dose is not properly gauged. Indifference to therapy or discontinuance will lead to the same results as in liver therapy.

4. We have not noted any intolerance to the drug or allergic manifestations so far.

5. We feel that proper dietary support may supplement the efficiency of the drug, even perhaps the additional use of hydrochloric acid, although we have not felt it necessary to avail ourselves of these additional therapeutic measures.

Diseases of White Blood Cells

The white blood cells or leukocytes may be divided into three general types; namely, granulocytes, lymphocytes and monocytes. The first of these may be subdivided further into neutrophil polymorphonuclear leukocytes, eosinophil leukocytes and basophil leukocytes. An additional type, which is usually considered with the granulocytes and may be included here, is the myelocyte, which may be demonstrable in the blood under pathologic conditions.

The functions of all of the white blood cells are not known; however, the defensive powers and phagocytic activity of the neutrophil polymorphonuclear leukocytes and the monocytes are recognized and have been demonstrated adequately. The activity of the eosinophil and basophil leukocytes and of the lymphocytes is not understood. The former are only slightly motile and possess but little phagocytic inclination, and the latter are constant figures seen infiltrating inflammatory areas and constitute a definite part of the picture of chronic inflammation. It has been assumed, probably correctly, that these small round cells play a significant part in the resistance of tissues surrounding an inflammatory process.

According to the "triple blast-cell" theory, the granulocytes originate from a primitive stem cell termed myeloblast, in the bone marrow, and external to the blood sinuses and marrow capillaries.[2] The daughter cells are termed myelocytes and are graded A, B and C depending on the age of the cell as determined by development of specific granulation and reduction in basophilic material. The fourth stage is termed metamyelocyte and is characterized by slight nuclear indentation and the first signs of ameboid movement. Finally the nucleus becomes deeply indented or constricted (lobe formation), ameboid motility is increased, and the cell makes its way through the wall of the sinus capillary by diapedesis, thus entering the general circulation as a young granular leukocyte (neutrophil, eosinophil or basophil). Like the erythrocytes, the replacement of white cells takes place practically entirely by division and redivision of the myelocytes, only an extremely small fraction originating from the original myeloblast or stem cell.

The lymphocytes arise from stem cells or lymphoblasts in central regions of the follicles in lymphoid tissue, such as the lymph glands and spleen, sometimes termed "germ centers." Through a series of changes the daughter cells progress

18. Kaufmann, J., and Schwager, P. G., Oral Folic Acid Therapy in the Treatment of Pernicious (Addisonian) Anaemia. *Canad. M. A. J.* 54:539 (June) 1946.

to formation of mature lymphocytes, and here again division and redivision of the daughter cells supply the replacements for lost lymphocytes.

The origin of the monocytes is a controversial subject. According to some investigators these leukocytes arise from histiocytes of the spleen and bone marrow. Others believe them to originate from lymphoblasts, whereas the adherents of the triple blast-cell theory contend that a cell, the monoblast, serves as the stem cell for the monocytes.[1]

Disturbances of the normal white blood cell count may result in either an increased number of these elements, as in the leukemias, or a decreased number as in agranulocytosis. Each of these conditions manifests certain oral symptoms and exercises certain limitations to dental procedures which merit a brief discussion.

The Leukemias

The leukemias are the result of leukopoietic tissues "gone wild." The leukocytes increase from a normal number of 4,500 to 7,500 to an amazing figure which may vary from 75,000 to 250,000, and may reach 1,000,000. Depending on the type of cell predominating in the increase, these dyscrasias have been termed lymphatic, myelogenous and monocytic leukemias, and each of these types may assume an acute or chronic nature.

The acute leukemias usually occur in youth and progress rapidly to a fatal termination within a few days or months, with the exception of those few cases which resolve themselves into a chronic leukemia. The differential diagnosis of the acute leukemias is difficult and often impossible. Lesions of the mouth are present in more than half of the patients with acute leukemia, and one of the earliest and most characteristic signs is an ulcerative or gangrenous stomatitis. Steady oozing of blood from the gums, as well as petechiae and ecchymosis, is common. Oral surgical procedures, except those of an emergency nature, are contraindicated in all cases of acute leukemia, and even emergency operations are carried through with extreme trepidation.

Chronic Lymphatic Leukemia

Chronic lymphatic leukemia presents a generalized hyperplasia of all lymphoid tissue and a characteristic blood picture in which the increased leukocyte count (usually less than 100,000) consists of 90 to 95 per cent small lymphocytes. Henny[14] has enumerated the oral findings in chronic lymphatic leukemia as follows: "chronic stomatitis with hyperplasia of gingival tissues; loosening of teeth; tendency to spontaneous hemorrhage; possible necrosis and gangrene." Any one or a progression of these may be manifest.

Chronic Myelogenous Leukemia

In chronic myelogenous leukemia there is a greatly increased number of white cells (from 100,000 to 600,000) with a marked hyperplasia of the granulocytes, particularly the immature forms; the neutrophilic myelocytes may comprise as much as 50 per cent of the white cell count. The oral symptoms are similar to those of chronic lymphatic leukemia; however, there seems to be an increased tendency toward ulceration and spontaneous hemorrhage. Friedenberg[19] has given his opinion that slough and faulty healing after dental operations has been overemphasized and corroborates his claims with a report of a case in which the patient underwent eleven oral operations without undue results.

Chronic Monocytic Leukemia

The existence of chronic monocytic leukemia has been debated for some time. However, more than a hundred cases

19. Friedenberg, Mervyn, Myelogenous Leukemia and Its Influence Upon Postoperative Healing. *J.A.D.A.* 28:943 (June) 1941.

have been reported in which there was marked leukocytosis with large numbers of mature and immature monocytes in the blood and large numbers of monoblasts and promonocytes in the sternal marrow.[12] The leukemic characteristic of swelling of the gums is manifest in approximately 80 per cent of these cases, and there is an increased frequency of ulceration and gangrenous stomatitis.

The prognosis in all cases of chronic leukemia is poor, and the average life expectancy after diagnosis is four to five years; however, life may extend for a period of thirteen years. Chronic leukemia can be said to be incurable; however, though there is no effective treatment, temporary remissions (varying from weeks to several months) may be attained by use of roentgen ray treatments of the bone marrow and spleen, and more recently by the ingestion of irradiated phosphorus. "In the chronic forms of leukemia, oral symptoms are absent for many years, and, during these periods, dental manipulations may be carried out with relative safety."[7] If oral surgical procedures are deemed necessary, a careful check of the patient's general condition and hematologic picture, with a record of the bleeding and clotting time, should be made before a final decision is reached.

Agranulocytosis

Agranulocytosis (agranulocytic angina) has been defined by Jackson[20] as "an acute, often fulminating disease characterized by an extreme leukopenia and neutropenia, accompanied by ulcerations of the mucous membranes, skin or gastrointestinal tract and, when untreated, leading to death in the great majority of cases."

The cause of agranulocytosis was placed rather vaguely as a manifestation of an overwhelming sepsis until 1932 when Kracke[9] and later Plum[21] indicated the coal tar derivatives, such as aminopyrine and related commercial drugs, as the causative agents in many of these cases. Though in a number of cases the cause is still unknown, it is wise to keep in mind the common use of these drugs and to realize the etiologic significance of them in this dread and often rapidly fatal malady.

The onset of agranulocytosis is sudden and is indicated as a rule by fever, chills and malaise accompanied by ulcerative and gangrenous lesions of the tonsils, gingival tissues and oral mucous membranes. These rapidly spreading lesions are excruciatingly painful, and it is usually this subjective symptom that first brings the patient to the dental office. The blood picture shows an extreme leukopenic state, in which the leukocyte count may be 1,000 or even less, with a great decrease or in some cases a complete absence of the granular leukocytes (polymorphonuclear leukocytes). In the latter cases death usually may be predicted in a matter of hours or several days at the most.

The fight for life in the treatment of agranulocytosis centers around three main factors: elimination of all drugs, prevention of infection and attempts to rejuvenate the depressed bone marrow. In the acute, extremely malignant leukopenic states all efforts are in vain and are not even palliative, death resulting with great rapidity. The so-called chronic agranulocytosis, however, may be aided somewhat by administration of nucleic acid derivatives, liver extract and small doses of roentgen rays to the long bones and, in addition, by blood transfusions.

Cases have been reported in which fatal agranulocytosis followed tooth extraction, and it is certainly an established fact that a definite neutrophilic depression follows tooth extraction or other oral surgical procedure. Most certainly no

20. Jackson, Henry, *The Leukopenic State and Agranulocytic Angina, A Textbook of Medicine.* Philadelphia: W. B. Saunders Co., 1941.

21. Plum, R., *Physical and Experimental Investigations in Agranulocytosis.* London: H. K. Lewis and Co., 1937.

dental treatment, particularly that involving tissue trauma, should be undertaken until the blood picture has been improved by medical treatment. Also, the state of health of the mouth should be maintained at the maximum, and a thoroughly efficient program of mouth hygiene should be instituted in order to prevent the development of a possibly fatal oral infection.

Dyscrasias Involving the Platelets

Thrombocytopenic purpura or Werlhof's disease has been defined by Minot[22] as,

> A disease that may be acute or chronic and is characterized by a marked and unaccountable diminution in the number of blood platelets, spontaneous hemorrhages from mucous membranes, and purpura (extravasations of blood into the skin and mucous membranes which may be pin point in size, petechiae, or much larger, ecchymoses).

It is generally believed that the blood platelets originate as fragments of protoplasm which are broken off the giant cells of the bone marrow, the megakaryocytes (Wiggers[2]; Best and Taylor[1]), and it has been suggested by Howell[23] that this breakdown occurs in most instances in the lung.

Thrombocytopenic purpura exists in two forms, acute and chronic, both of which are of unknown cause. Therefore, they usually are termed "diopathic." No cause has been found for the platelet deficiency as in most cases the originating cells, megakaryocytes, appear perfectly normal on sternal puncture. In some cases there may be a diminution in the megakaryocytes, the resulting purpura hemorrhagica being acute in nature and unresponsive to all forms of therapy. Many cases of primary thrombocytopenic purpura may be traced to increased platelet destruction by the spleen, and ligation of the splenic artery or splenectomy may be necessary, resulting in an immediate increase in the platelet count.

The chronic form of this disease is by far the most often encountered. The condition may present a fluctuating course, with times during which the blood picture may be almost normal and times of extreme thrombopenia. The symptoms manifested are: bruising from slight trauma which usually is seen as a large ecchymotic area on the extremities, spontaneous hemorrhage from the gingivae and oral mucous membranes, numerous petechiae of the skin and mucous membranes, and severe uncontrollable hemorrhage after tooth extraction. Nose bleeds, increased menstrual flow and hematuria also may be symptoms.[5]

The laboratory findings in these cases, as enumerated by Comroe, Collins and Crane[5] are: (1) a marked decrease in the blood platelets, (2) prolongation of the bleeding time, (3) delayed or absent clot retraction, (4) positive tourniquet test, (5) normal coagulation time and (6) signs of anemia, depending on the amount of blood lost.

Many substances and methods have been suggested for the treatment of this condition, the most important of which is probably a combination of blood transfusion and roentgen ray irradiation of the spleen to improve the blood picture temporarily. This is followed by splenectomy when the blood picture indicates the most propitious time for operation.

It is certainly not a wise procedure to initiate any dental operations which may produce hemorrhage in those persons with symptoms of thrombocytopenic purpura. However, in those chronic cases in which there are periods of remission, as demonstrated by clinical and laboratory findings, the most conservative types of dental operations may be undertaken. Probably the wisest procedure in all cases of thrombocytopenic purpura is to delay all dental treatment, and particularly sur-

22. Minot, G. R., *Purpura, A Textbook of Medicine.* Philadelphia: W. B. Saunders Co., 1941.
23. Howell, W. H., and Donahue, D. D., Production of Blood Platelets in Lungs. *J. Exper. Med.* 65:177 (February) 1937.

gical intervention, until such time as the best possible general resolution has been obtained from medical treatment and general surgical procedures such as splenectomy.

Hemophilia, the age-old so-called bleeding disease, is a perfect example of sex-linked heredity, being transmitted to the male children of a family by their mother. The defect seems to be one of decreased platelet fragility, the quantitative blood picture and structure of the other blood cells being entirely normal. This qualitative defect of the blood platelets results in a prolonged coagulation time, since the increased resistance of these cells to disintegration prevents the liberation of thrombokinase by them. All the remaining essentials for clot formation, fibrinogen, prothrombin and calcium, are present in normal amounts in hemophilic blood, and bleeding time and clot retraction are apparently within normal limits.

Coagulation Test

In many cases infants affected with hemophilia never reach adulthood, death having resulted from hemorrhage long before puberty. Those patients who do not attain maturity may have startling hemorrhage from the slightest trauma, and fatal termination of such dental procedures as tooth extraction are highly possible. In those cases in which there is an alleged bleeding tendency, it is always the wisest procedure to perform a coagulation test before attempting any oral surgical treatment; the loss of time is but slight and if the patient is truly a victim of hemophilia a life will have been saved.

It generally is believed that the optimum time for necessary dental extractions in hemophiliacs is several hours after a blood transfusion, the coagulability of the blood reaching its maximum in six hours after transfusion. Snake venom used locally or oxalic acid injected hypodermically may serve as adjuncts.

Summary and Conclusion

An attempt has been made in this paper to give a brief description of those blood dyscrasias which are thought to be the most important to the dental practitioner and to correlate the physiologic processes and deviations from this normal as manifested by the clinical examination and blood picture.

The oral symptoms of the blood dyscrasias should be understood thoroughly by the dental practitioner. As a general rule, no dental work involving trauma to the tissues, particularly no oral surgical procedure, should be undertaken in any case in which there is the slightest evidence of a blood dyscrasia, whether this evidence is grossly obvious clinically or is obtained from the patient's history. If such evidence exists, complete differential blood counts should be obtained, as well as bleeding and coagulation times. If these laboratory tests show the existence of a blood dyscrasia the patient should be referred immediately to a skilled internist, so that any possible remedial or curative measures may be instituted. Only when there is cure or definite improvement of the condition, as demonstrated by appropriate laboratory methods, should surgical procedures be undertaken. Failure to observe these basic precautionary measures may result in death of the patient and ruination of the dental practitioner responsible for such a travesty of the practice of professional dentistry.—*2400 River Oaks Boulevard.*

NUTRIENT CANALS:

A ROENTGENOGRAPHIC STUDY

Duane W. Lovett, D.D.S., Iowa City

THE objectives of this study are to help clarify the term "nutrient canals," to report the frequency of their roentgenographic appearance in the maxilla and mandible and to classify them as to their roentgenographic appearances.

The discussion of nutrient canals of the maxilla and mandible has reached successively broader stages of understanding, since they first were mentioned by Hirschfeld in 1923.[1] He attempted to establish the opinion that this anatomic condition, as it appeared in roentgenographs of the maxilla and mandible, was normal, and that nutrient canals could be differentiated from other linear roentgenolucent regions in the interdental alveolar process. Later, he designated these structures as "interdental canals."[2] Since Hirschfeld's report, Batson,[3] Ennis,[4, 5] Pollia,[6] Sweet[7] and Ryder[8] have helped confirm his opinion that these anatomic structures were a normal anatomic condition.

Several terms have been used in referring to nutrient canals. Batson[3] suggested that the name "interdental canals" be changed to the more descriptive "nutrient canals," because the canals are paradental as well as interdental and their function is to carry nutrition to the parts by means of the interdental arteries. Sweet[7] later also suggested that the term "nutrient channels" was preferable. He stated,

> In dental anatomy "Canal" means a "Tubular" channel. Since these "nutrient channels" are sometimes tubular and at other times merely a groove, the word "channels" seem to be more apt, for it means "a canal, groove, or deep furrow." The word canal can still be used to advantage for tubular channels such as the mandibular canal.

Dorland[9] defines canal as "any tubular and relatively narrow passage or channel." From a true osteologic viewpoint the term "channel" is more nearly correct, but from the anatomic viewpoint "canal" is more correct. From this discussion, the term "nutrient canal" seems to be preferable, and it will be used in the subsequent designations of this anatomic condition.

The significance of the roentgenographic appearance of nutrient canals has had various interpretations. Hirschfeld[1] originally suggested that the visibility of the interdental canals in roent-

Read at the eighty-eighth annual meeting of the American Dental Association, Boston, August 7, 1947.

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1. Hirschfeld, Isador, A Study of Skulls in the American Museum of Natural History in Relation to Periodontal Disease. *J. D. Res.* 5:241 (December) 1923.

2. Hirschfeld, Isador, Interdental Canals. *J.A.D.A.* 14:617 (April) 1927.

3. Batson, O. V., and Ennis, L. M., Roentgenological and Anatomical Study of Maxillary Sinus. *Am. J. Roentgenol.* 35:586 (May) 1936.

4. Ennis, L. M., Roentgenographic Variations of the Maxillary Sinus and the Nutrient Canals of the Maxilla and the Mandible. *Int. J. Orth. & Oral Surg.* 23:173 (February) 1937.

5. Ennis, L. M., *Dental Roentgenology*, Philadelphia: Lea & Febiger, 1939, pp. 244-252, 255-267.

6. Pollia, J. A., The Fundamental Principles of Alveolo-Dental Radiology. Brooklyn: D. Items of Interest Pub. Co., 1930, p. 320.

7. Sweet, A. P. S., A Statistical Analysis of the Incidence of Nutrient Channels and Foramina in Five Hundred Periodical Full-Mouth Radiodontic Examinations. *Am. J. Orthodont. & Oral Surg.* 28:497 (July) 1942.

8. Ryder, W. R., The Significance of "Circulatory Canals" in Roentgenograms of the Alveolar Process. *Am. J. Orthodont. & Oral Surg.* 28:640 (October) 1942.

9. Dorland, W. A. N., *Medical Dictionary*. Philadelphia: W. B. Saunders Company, 1944.

genographs of the maxilla and mandible in some instances might be utilized as a diagnostic aid in confirming a calcium deficiency, such as is associated with rickets and tuberculosis, just as roentgenographs of the tibia are used to confirm the presence of these conditions. In 1930, Pollia[6] associated nutrient canals with disuse atrophy and stated,

> A very positive sign of disuse is the presence of one or more vascular channels in the radiograph of the alveolar process, although their occurrence is of no value in the antrum image as this is a thin bony plate at best and very apt to show the finer anatomical detail of structure.

In 1942, Ryder[5] offered the opinion that the variations in anatomic form and structures of the maxilla and mandible were found to be important, because the nutrient canals were seen frequently in patients who had thin ridges, in whom the marrow cavity seemed to be eliminated, giving the impression that these canals were seen in roentgenographs only when located in solid bone structures. These investigators have varied in their opinions of the significance of the roentgenographic appearance of the nutrient canals.

Table 1.—Frequency of roentgenographic appearance of nutrient canals in 522 patients, aged 15 to 72 years, having not more than six missing teeth

Segment	Cases	Percentage
Maxilla		
Anterior	462	88
Posterior		
Right	468	89
Left	472	90
Mandible		
Anterior	482	92
Posterior		
Right	483	92
Left	483	92
Men	225	43
Women	297	57

Table 2.—Frequency of roentgenographic appearance of nutrient canals in 444 edentulous patients, with an age range of 26 to 68 years

Segment	Cases	Percentage
Maxilla		
Anterior	444	100
Posterior		
Right	444	100
Left	444	100
Mandible		
Anterior	444	100
Posterior		
Right	444	100
Left	444	100
Men	179	40.3
Women	265	59.7

Material

The material for this study consisted of 966 routine cases at the State University of Iowa, College of Dentistry, in which a complete roentgenographic examination was made. Of this total, 522 patients had not more than six missing teeth, excluding the third molars, and 444 patients were edentulous. The age range of the 522 patients was 15 to 72 years. Of these, 225 (43 per cent) were men and 297 (57 per cent) were women. The age range of the edentulous group was 26 to 68 years, with 179 (40.3 per cent) men and 265 (59.7 per cent) women. The total number of intra-oral roentgenographs studied was 11,748.

Procedures

The maxillary and mandibular roentgenographs for all 966 persons were divided into segments to facilitate statistical recording of observations. Each arch was divided into three segments. The anterior segment included the area from cuspid to cuspid. The posterior segments, both right and left, consisted of the area from the cuspid to the retromolar or tuberosity area. The six segments in each

case were studied and recorded individually. All roentgenographs were mounted and studied under the same transilluminating facilities with the aid of magnification.

Observations

The statistical tabulations for the 522 patients with teeth are shown in Table 1. In the anterior segment of the maxilla, nutrient canals were observed in 462 persons (88 per cent). In the right posterior segment of 468 persons (89 per cent) and in the left posterior segment of 472 persons (90 per cent), nutrient canals were noted. In the mandible, nutrient canals were observed in the anterior segment in 482 persons (92 per cent). The posterior segments, both right and left, were identical, with nutrient canals noted in 483 persons (92 per cent) for each segment.

The statistical tabulation for the edentulous persons is shown in Table 2. In every edentulous person, nutrient canals were observed in all three segments of the maxilla and in all three segments of the mandible, to make the observation 100 per cent in all cases.

During the course of this study, nutrient canals of various size, shape, course and roentgenographic density were observed. By their roentgenographic appearance they apparently could be divided into three definite categories. The following roentgenographic classification of nutrient canals of the maxilla and mandible seems to be most logical.

Type 1. A radiolucent line, varying in size, as a fine thread-like marking to a width of ½ mm., and in length from twice its width to 2 cm. The course of this radiolucent line may be linear, circular, haphazard or a combination of any or all three.

Type 2. A moderately radiolucent line, varying in size from ½ mm. to 1½ mm. in width, and in length from 3 mm. to 2½ cm. Their course is linear or circular and only occasionally haphazard.

Type 3. A broad, usually only slightly radiolucent, line varying in size from 1½ mm. to 4 mm. in width, and in length can be traced from 6 mm. to 7 cm. Their course is mostly linear, with smooth turns or tight circular turns in the area of the mental foramen of the mandible. They are found only in the mandible and are the mandibular canals and their large branches.

The type 1 nutrient canals (Fig. 1) were observed mostly in edentulous regions, at or near the crest of the alveolar ridges of both the maxilla and mandible. They also were observed in the region of the antrum, and their course frequently could be traced from this region on down into the alveolar ridge. They generally are seen in regions in which osseous resorption has occurred or is active. They seem to be characteristic of the cortical bony structures.

The type 2 nutrient canals (Fig. 2) are characteristic of the medullary bony structures and are observed in both the maxilla and mandible of patients with or without teeth. They are not as radiolucent as type 1, and in many cases close observation is necessary to indicate their presence.

The type 3 nutrient canals (Fig. 3) are variable in size and radiolucency, but their course is generally the same. Their location within the mandible is variable both vertically and horizontally. The greatest variance of significance is in the third molar region where the canal may be 4 or 5 mm. from the crest of the alveolar ridge to 4 or 5 mm. from the inferior border of the mandible. The large branches of this canal going forward from the mental foramen region into the anterior segment of the mandible frequently are observed.

In many of the cases studied, one roentgenograph displayed nutrient canals of both type 1 and type 2. Frequently the intra-oral roentgenographs of the posterior segment of the mandible displayed

all three types of nutrient canals. Type 1 and type 3 are fairly readily observed. The finding of type 2 often requires some study, but they can be traced for some distance once they are observed. The observation of nutrient canals in the roentgenographs of the age group of 15 to 21 was much more difficult than in the older age groups.

The roentgenographic appearance of nutrient canals in the very young adult bony structures of the maxilla and mandible is not as demonstrable as it is in the older adult bony structures.

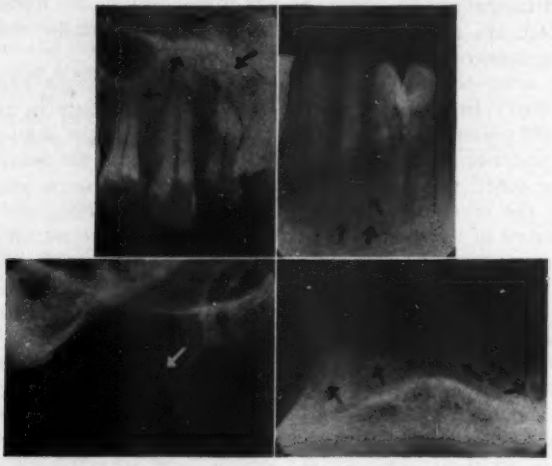

Fig. 1.—Type 1 nutrient canals

Summary and Conclusions

The roentgenographic appearance of nutrient canals in the maxilla and mandible can be designated in three categories and classified into three groups.

Type 1 nutrient canals are the smallest of the three types. They are normally the most radiolucent, and characteristically seem to be associated with the cortical bony structures. Their course may be linear, circular, haphazard or a combination of any or all three.

Type 2 nutrient canals are only moderately radiolucent and are larger than type 1. They are characteristically associated with the medullary bony structures of the mandible and maxilla and occur in patients with and without teeth. They generally follow a linear or circular course.

Type 3 nutrient canals, the largest of the three types, are the large mandibular canals. They vary in radiolucency, but are usually only slightly radiolucent. Their course is mostly linear, with smooth or tight circular turns in the region of the mental foramen of the mandible.

Nutrient canals in 522 patients with teeth were observed in the anterior segment of the maxilla in 88 per cent of the cases, in the right posterior segment in 89 per cent of the cases and in the left posterior segment in 90 per cent of the cases. In the mandible they were observed in the anterior segment in 92 per cent of the cases and in both the right and left posterior segments in 92 per cent of the cases for each segment. In

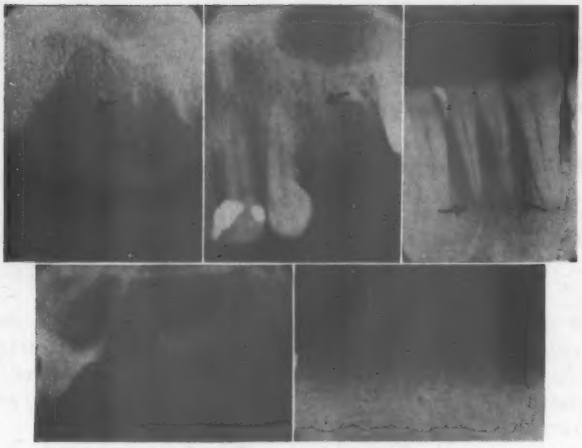

Fig. 2.—Type 2 nutrient canals

444 edentulous patients, nutrient canals were observed in all segments of the maxilla and mandible.

Nutrient canals are normal anatomic structures and are present in all segments of the maxilla and mandible. Their appearance in the roentgenograph is normal, and their form is more apparent in the edentulous bony structures than in the bony structure where teeth are present. This is due primarily to the simple structural pattern of the edentulous alveolar bone which does not have the lamina dura of the tooth sockets and its intricate cancellous bone supporting pattern, to be superimposed over the nutrient canal image and block out its appearance. The edentulous bony areas have only the outer cortical plates and the lace-like supporting pattern of the cancellous bone, which can be recorded more minutely radiographically than the dentition regions where the tooth root and lamina dura are superimposed over a great percentage of the alveolar bone. Their appearance is more pronounced in areas of advanced resorption of the alveolar bone, but this appearance is due to the ability of the roentgenograph to record more clearly the thinner bony structures.

This study indicates that nutrient canals are normal anatomic structures and can be demonstrated in all segments of the maxilla and mandible in edentulous patients and in a very high percentage of patients in whom teeth are present. The classification into types 1, 2 and 3 is suggested for the roentgenographic appearance of the nutrient canals.

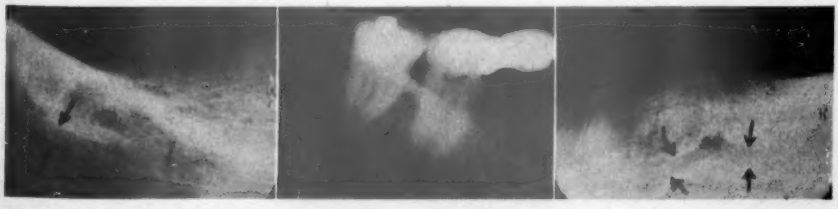

Fig. 3.—Type 3 nutrient canals. Types 1 and 2 nutrient canals also are present

CARIES-CONDUCIVE EFFECT OF A PURIFIED DIET WHEN FED TO RODENTS DURING TOOTH DEVELOPMENT

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THE USE of refined carbohydrates, especially sugar, in modern diets has been for many years one of the most discussed factors relative to dental caries. Half a century has elapsed since the above relation first was investigated extensively.[1] But it is still disputable whether the caries-producing effect of a high sugar intake is caused primarily by an unfavorable effect on the oral environment or on the character of the teeth themselves. An inverse relation has been shown to exist between children's consumption of protective foods and of refined carbohydrates.[2] The relative importance attached to a decrease in the former, versus the simultaneous increase in the latter food source, consequently is a matter of controversy among research workers.

The following work deals first with an experimental approach, Part I, which makes provision for the desired separation of the "external" and the "internal" effect of a purified high carbohydrate ration on the production of dental caries. Part II consists of a reinterpretation of earlier observations in animals in the light of the results of this experimental approach.

PART I. EXPERIMENTAL APPROACH

The caries susceptibility of three species of rodents has been compared under three major experimental variables:

1. Animals were born to mothers subsisting on a stock diet of natural food constituents and continued on the same diet throughout and after completion of tooth development.

2. Animals were born to mothers subsisting on the stock diet, but at weaning were transferred to a purified ration high in sucrose and complete in known nutritional essentials.

3. Animals were born to mothers subsisting on the purified ration and continued on the same ration throughout the experimental period.

The composition and nature of the rations are shown in Tables 1 and 2. The purified ration was prepared from adequate quantities of all those nutriments which are known to assure general health, growth and reproduction in the rodent. When supplemented with ascorbic acid, this ration is essentially

Presented at the eighty-eighth annual meeting of the American Dental Association, Boston, August 8, 1947.

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The Nutrition Foundation, Inc., New York, granted financial support for this study.

1. Miller, W. D., *The Micro-organisms of the Human Mouth*. Philadelphia: The S. S. White Dental Mfg. Co., 1890.

2. Sognnaes, R. F., and White, R. L., Oral Conditions of Children in Relation to State of General Health and Habits of Life. *Am. J. Dis. Children* 60: 983 (August) 1940.

Table 1.—Components of the purified and the natural ration

Components	Purified ration (experimental)	Purina laboratory chow checkers (stock diet)
Carbohydrates	67% (granulated cane sugar)*	48.46%
Protein	24% (casein)	26.18%
Fat	5% (corn oil)	5.35%
Fiber and moisture	0	13.52%
Ash	4% (salt mixture)†	6.49%
Calcium	0.53%	1.17%
Phosphorus	0.55%	0.87%
Magnesium	0.033%	0.196%
Iron	150 p.p.m.	327 p.p.m.
Manganese	50 p.p.m.	106.0 p.p.m.
Copper	15 p.p.m.	16.8 p.p.m.
Cobalt	0.65 p.p.m.	0.14 p.p.m.
Potassium	0.45%	0.90%
Sodium	0.44%	(?)
Chlorine	0.76%	0.57%
Iodine	20 p.p.m.	4.5 p.p.m.
Zinc	30 p.p.m.	(?)
Sulphur	480 p.p.m.	(?)
Fluorine	2.5 p.p.m.	21.0 p.p.m.
Vitamins		
Thiamin	3.5 p.p.m.	12.85 p.p.m.
Riboflavin	3.5 p.p.m.	7.49 p.p.m.
Nicotinic acid	25.0 p.p.m.	65.6 p.p.m.
Vitamin D	1.5 USP U/Gm.	0.45 USP U/Gm.
Vitamin A	30.0 USP U/Gm.	9.0 USP U/Gm.
p-Amino-benzoic acid	300 p.p.m.	(?)
Pantothenic acid	20 p.p.m.	50.6 p.p.m.
Pyridoxine	3.5 p.p.m.	(?)
Inositol	1,000 p.p.m.	(?)
Choline	1,000 p.p.m.	(?)
Liver concentrate	4% (supplement)	(?)
Other factors included	None	Unrecognized kinds and amounts

*In experiments where the sucrose fraction has been exchanged by dextrin or whole wheat flour, the ration has been named accordingly in the text and tables.

†Modification of Phillips' and Hart's salt mixture (*J. Biol. Chem.* 109:657, 1935) by Shaw, J. H., Carious Lesions in Cotton Rat Molars. *J. D. Res.* 26:47 (February) 1947.

the same as that which has been shown to give excellent growth in the primate.[3] The Purina laboratory ration is made from natural food constituents. Its known components have been recorded from analysis made by the Purina Company (*Care and Feeding of Laboratory Animals,* B-2362). A stock diet especially made for feeding of hamsters, rats and mice, this product is kept as uniform as possible with a low content of alfalfa which assures a constantly lower fluorine content than in similar products.[4] The trace amount of fluorine in the purified ration is not added for general nutritional

3. Waisman, H. A., and others, Studies on Nutritional Requirements of Rhesus Monkeys. *J. Nutrition* 26:205 (August) 1943.

4. Schaefer, H. C., personal communication, Purina Company.

Table 2.—Comparison of particle size of purified ration and coarse caries-producing ration

Ingredients	Amount (%)	Percentage distribution of particles (Grams per 100 Gm. of sample)			
		Over 20 mesh	20–40 mesh	40–60 mesh	Below 60 mesh
Purified ration					
Cane sugar	67	0.3	39.2	42.4	18.1
Casein (and B-vitamins)	24	0	26.0	42.2	31.8
Salt mixture	4	2.2	18.1	12.5	67.2
Corn oil (and fat-sol. vit.)	5	0	0	0	(5)
Sum of ingredients	100	0.3	33	39	27
Subject to mastication*	24	0	6	10	8
Coarse ration†					
Coarse corn‡	60	100.0	0	0	0
Linseed meal	6	19.6	31.7	19.2	29.5
Alfalfa meal	3	0.2	37.9	21.4	40.5
Sodium chloride	1	0	24.5	64.4	11.1
Powdered milk	30	0	0	0	100.0
Sum of ingredients	100	61	3	2	34
Subject to mastication*	69	61	3	2	3

*Portion which is not dissolved readily in saliva.
†Hoppert-Webber-Caniff diet. Analysis taken from Sognnaes, R. F., Studies in Masticatory Efficiency of Rats, *Am. J. Orthodont. & Oral Surg.* 27: (Oral Surg. Sec.) 383 (July) 1941.
‡Unlike whole grain or larger food checkers (such as our "stock diet") the 20 mesh particles are too small to be manipulated well by the rats' foreleg paws and gnawed off by the incisors. As a result the molars tend to fracture and become carious after masticating the 20 mesh particles (Sognnaes, 1941).

purposes; it arises from minor impurities in the carbohydrate fraction and the salt mixture.[5]

The experimental program was carried out in two series. In Series A, 53 Syrian hamsters (Table 3), 43 Long-Evans strain rats (Table 4) and 36 white mice (Table 5) were grouped as indicated in the tables.

The main experimental variable studied in this series was the effect of the ration used before eruption of the teeth. In Series B the observations were extended to a larger variety of rations and a greater number of animals of one species, in all 110 rats, grouped as shown in Tables 6, 7 and 8.

After sacrifice of the animals the jaws were examined under binocular microscope (x 30). Representative jaws were photographed, roentgenographed and finally prepared for histologic examination.

The scoring of the molar lesions (based on the binocular examination) was done by a modification of the method previously used in hamsters[6] and adapted to the rats and mice to make the records of the three species comparable. Because the purified, caries-producing ration was powdered finely, the lesions were not complicated by the artificial, mechanical fractures encountered in earlier work, when rats were fed coarse diets[7] (Table 2).

The carious lesions to be described were more nearly comparable to human caries than any experimental lesions seen

5. Shaw, J. H., and others, Dental Caries in the Cotton Rat. IV. Inhibiting Effects of Fluorine Additions to the Ration. *Proc. Soc. Exper. Biol. & Med.* 59:89 (May) 1945.

6. Keyes, P. H., A Method of Recording and Scoring Gross Carious Lesions in the Molar Teeth of Syrian Hamsters. *J. D. Res.* 23:439 (December) 1944.

7. Sognnaes, R. F., Studies on Masticatory Efficiency. IV. Mastication and Experimental Rat Caries. *Am. J. Orthodont. & Oral Surg.* 27: (Oral Surg. Sec.) 532 (October) 1941.

Table 3.—Pre-eruptive influence of purified ration on the caries susceptibility of the teeth of Syrian hamsters

Group & no. of hamsters	Ration during dental development		Oral environment after eruption of the teeth					
	Prenatal life	Lactation (infancy)	Ration	Age period exposed* (months)	Carious molars	Carious cavities	Caries score	Score per months of oral exposure
1a 13	Stock	Stock	Stock	1st-5th (4)	0.8	0.8	0.8	0.2
1b 15	Stock	Stock	Stock	1st-8th (7)	1.0	1.2	1.2	0.2
1 28	(Average)			(4-7)	0.9	1.0	1.0	0.2
2a	Stock	Stock	Sucrose	4-8 (4)	2	2	2	0.5†
	Stock	Stock	Sucrose	4-8	2	3	3	0.8
	Stock	Stock	Sucrose	4-8	3	4	4	1.0
	Stock	Stock	Sucrose	3-8 (5)	5	5	5	1.3
	Stock	Stock	Sucrose	3-8	5	6	6	1.6
	Stock	Stock	Sucrose	3-8	6	6	7	1.8
	Stock	Stock	Sucrose	3-8	4	7	8	2.1
					3.8	4.7	5.0	1.3
2b	Stock	Stock	Sucrose	1-5 (4)	2	2	2	0.5
	Stock	Stock	Sucrose	1-5	4	6	6	1.6
	Stock	Stock	Sucrose	1-5	5	4	6	1.6
	Stock	Stock	Sucrose	1-5	5	5	7	1.8
	Stock	Stock	Sucrose	1-5	5	6	7	1.8
	Stock	Stock	Sucrose	1-5	7	9	9	2.4
					4.6	5.3	6.1	1.6
2c	Stock	Stock	Sucrose	1-8 (7)	10	14	18	2.4
	Stock	Stock	Sucrose	1-8	10	19	25	3.2‡
	Stock	Stock	Sucrose	1-8	10	19	31	4.0
	Stock	Stock	Sucrose	1-8	8	17	34	4.4
					9.5	17.3	27.0	3.5
2 17	(Average)			(4-7)	4.5	7.9	10.6	1.9
3a	Stock	Sucrose	Sucrose	1-3 (2)	4	5	9	4.5
	Stock	Sucrose	Sucrose	1-3	5	9	14	7.0
	Stock	Sucrose	Sucrose	1-3	7	13	17	8.5
	Stock	Sucrose	Sucrose	1-3	7	14	27	13.5
	Stock	Sucrose	Sucrose	1-3	8	23	35	17.5
					6.2	12.8	20.4	10.2
3b	Sucrose	Sucrose	Sucrose	1-3 (2)	8	27	40	20.0
	Sucrose	Sucrose	Sucrose	1-3	9	33	51	25.0
	Sucrose	Sucrose	Sucrose	1-3	10	35	53	26.5
					9	31.6	48.0	23.8
3 8	(Average)			(2)	7.3	20.0	31.0	15.3

*Figures in parentheses indicate the actual number of months during which the teeth were exposed to the given ration after eruption into the oral cavity.
†Mother of Group 3a; was fed the sucrose diet one month preceding mating, stock diet during pregnancy.
‡Mother of Group 3b; was fed the sucrose diet four months preceding mating and continuously thereafter.

or reported in previous publications by the author. Indeed, no significant differences from human caries can be pointed out at present.

Experiments in Hamsters, Rats and Mice

Series A.—The findings in hamsters, rats and mice have been recorded in Tables 3, 4 and 5, respectively; the latter permits a direct comparison of the three species. All tables contain the number of animals in each group, the breeding diet, the caries-producing experimental diet and the period during which the animals were exposed to the latter. The number of carious molars, affected areas (cavities) and carious score (that is, areas times first, second or third degree penetration) are listed. The tabulated lesions are those seen by binocular microscope.

Table 4.—Pre-eruptive influence on the caries susceptibility of rats' molars

No. of rats	Ration during dental development		Oral environment after eruption of teeth					
	Prenatal life	Lactation	Ration	Length of exposure (months)	Dental effects: Carious molars	Dental effects: Carious cavities	Dental effects: Caries score	Score per months of exposure
15	Stock	Stock	Stock	7–9	0	0	0	0
2	Stock	Stock	Sucrose	3	0	0	0	
	Stock	Stock	Sucrose	3	0	0	0	
	Stock	Stock	Sucrose	5	0	0	0	
	Stock	Stock	Sucrose	5	0	0	0	
	Stock	Stock	Sucrose	5	0	0	0	
	Stock	Stock	Sucrose	5	0	0	0	
	Stock	Stock	Sucrose	5	0	0	0	
	Stock	Stock	Sucrose	5	0	0	0	
	Stock	Stock	Sucrose	5	0	0	0	
	Stock	Stock	Sucrose	5	0	0	0	
	Stock	Stock	Sucrose	7	0	0	0	
	Stock	Stock	Sucrose	7	0	0	0*	
12				3–7	0	0	0	0
3	Stock	Sucrose	Sucrose	4	1	1	1	
	Stock	Sucrose	Sucrose	4	1	1	1	
	Stock	Sucrose	Sucrose	4	2	2	2	
	Stock	Sucrose	Sucrose	4	3	3	3	
	Stock	Sucrose	Sucrose	4	3	3	4	
6				4	2.0	2.0	2.2	0.6
4	Sucrose	Sucrose	Sucrose	2	0	0	0	
	Sucrose	Sucrose	Sucrose	2	1	1	1	
	Sucrose	Sucrose	Sucrose	2	1	1	1	
	Sucrose	Sucrose	Sucrose	2	2	2	2	
	Sucrose	Sucrose	Sucrose	2	2	2	2	
	Sucrose	Sucrose	Sucrose	2	3	3	3	
	Sucrose	Sucrose	Sucrose	2	3	4	4	
	Sucrose	Sucrose	Sucrose	2	4	4	4	
	Sucrose	Sucrose	Sucrose	2	4	5	5	
	Sucrose	Sucrose	Sucrose	2	4	5	5	
10				2	2.4	2.7	2.7	1.4

*Mother of group 4.

Table 5.—Comparative increase in caries susceptibility of hamsters, rats and mice when "bred" on a high sucrose diet (Series A)

Species	Number of animals	Breeding diet	Posteruptive (experimental)		Average caries incidence		
			Diet	Period (months)	Molars affected	Areas affected	Caries score
Hamsters.....	6	Stock	Sucrose	4	4.6	5.3	6.1
Rats.....	12	Stock	Sucrose	4	0	0	0
Mice.....	15	Stock	Sucrose	4	0	0	0
Hamsters.....	3	Sucrose	Sucrose	2	9.0	31.6	48.0
Rats.....	10	Sucrose	Sucrose	2	2.4	2.7	2.7
Mice.....	21	Sucrose	Sucrose	2	0.4	0.5	0.5

A comparison of the history of the three groups of animals shows that the hamsters (Table 3) were the only ones developing caries when bred and fed on the stock diet. But the incidence was very low with an average of only one affected molar per animal after seven months. When bred on the stock diet and then, from weaning time, fed the sucrose diet (Group 2), the number of carious teeth, after only four months, was four times higher, after seven months, nine times higher than the above control.

When the sucrose diet was begun during lactation (Group 3a), caries became several times as severe as in Group 2 in less than half the experimental period.

In the next experimental group (3b), offspring of parents bred on the sucrose diet, the extent of caries again doubled over that in Group 3a. Males and females were represented equally, but within each group the females have a tendency to take their place in the lower caries score, which accounts for the range. In animals placed on the sucrose diet before, during and after tooth development, respectively, there was a ratio of 20:10:2 in carious destruction per month of posteruptive oral exposure to the diet. Figure 1 illustrates this ratio; some of the carious lesions are shown in Figures 2 and 3. Figure 2 illustrates the development of a lesion found only in teeth which developed on the sucrose diet. (P. H. Keyes, who has inspected these lesions, has not observed any in the hundreds of hamsters studied by him.)

This location of caries in the smooth lingual surfaces of the maxillary second molars has not been reported previously in animals and may be of significance as a possible counterpart for this type of caries in man.

Figure 3 shows the pathogenesis of the more common lesions of the hamsters, namely, those of the maxillary, occlusal and mandibular buccal surfaces of the first molars. It is interesting to note that the secondary dentin formation is

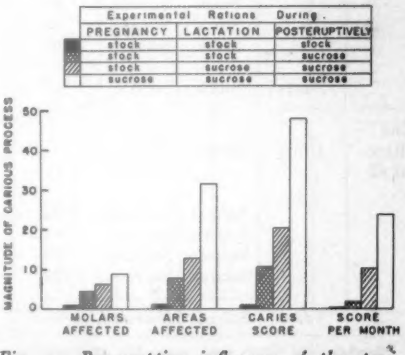

Fig. 1.—Pre-eruptive influence of the purified (sucrose) ration on the caries susceptibility of hamsters

Table 6.—Influence of prenatal and postnatal diet on experimental rat caries* (Series B)

Group	No. animals	Prenatal diet	Postnatal experimental			Dental findings at end of experiment			
			Diet	Start (days)	Duration (months)	Car. mol.	Car. cav.	Car. score	Score per month
Parents	Father	Stock	Sucrose	150	6‡	0	0	0	0
	Mother #1	Stock	Sucrose	90	8	0	0	0	0
	Mother #2	Stock	Sucrose	90	8‡	0	0	0	0
1st litter of #1	4 rats	Stock	Whole wheat	10	6	0	0	0	0
		Stock	Sucrose	10	6	0	0	0	
		Stock	Sucrose	10	6	4	4	7	
		Stock	Sucrose	10	6	4	5	8	
		Stock	Sucrose	10	6	4	8	11	
	4 rats	Stock	Sucrose	10	6	3.0	4.2	6.5	1.1
2nd litter of #1		Sucrose	Dextrin	21	3	0	0	0	
		Sucrose	Dextrin	21	3	0	0	0	
		Sucrose	Dextrin	21	3	1	1	1	
		Sucrose	Dextrin	21	3	1	2	2	
	4 rats†	Sucrose	Dextrin	21	3	0.5	0.7	0.7	0.2
		Sucrose	Sucrose	10	3	4	7	10	
		Sucrose	Sucrose	10	3	4	8	13	
		Sucrose	Sucrose	10	3	5	8	13	
		Sucrose	Sucrose	10	3	6	9	13	
	4 rats†	Sucrose	Sucrose	10	3	4.7	8.0	12.2	4.1
1st litter of #2		Stock	Sucrose	10	4	1	1	1	
		Stock	Sucrose	10	4	1	1	1	
		Stock	Sucrose	10	4	2	2	2	
		Stock	Sucrose	10	4‡	3	3	3	
		Stock	Sucrose	10	4	3	3	4	
		Stock	Sucrose	10	5	1	1	1	
		Stock	Sucrose	10	5	4	4	6	
		Stock	Sucrose	10	5	4	5	6	
		Stock	Sucrose	10	8	5	10	16	
	9 rats	Stock	Sucrose	10	4-8	2.6	3.3	4.4	0.9
2nd litter of #2	4 rats	Sucrose	Whole wheat	22	3	0	0	0	0
		Sucrose	Sucrose	10	3	4	8	9	
		Sucrose	Sucrose	10	3	6	9	12	
		Sucrose	Sucrose	10	3‡	5	7	20	
		Sucrose	Sucrose	10	3	7	13	20	
	4 rats	Sucrose	Sucrose	10	3	5.5	9.2	15.2	5.1

*Brothers and sisters from succeeding pregnancies.
†Mother on sucrose diet for four months preceding birth of litter.
‡See illustration in Figure 4 for comparison of these rats.

marked from beginning to end. Structural faults have not been observed in the enamel sections studied so far. No chemical or physical properties have been tested as yet.

No caries developed in rats (Table 4) exposed to the sucrose diet for seven months, provided formation of the teeth had been completed on the stock diet. But when the rats were conceived as well as raised on the sucrose diet, caries developed after a period of only a few months of oral exposure of the teeth. Under similar experimental conditions even the mice showed some initial lesions, as seen from Table 5, after two months posteruptive feeding. In the latter table where comparable experimental periods are recorded, the species-difference becomes apparent as well as the comparative effect of the breeding diet on the final caries score.

It is interesting to compare the caries incidence in these groups because of the differences in the anatomy of their teeth. The depth and narrowness of the occlusal fissures are related inversely to the caries susceptibility. The hamster molars with their wide shallow grooves were found to be most susceptible, the rat and mouse molars least so. There must be other and more fundamental reasons for this species difference.

The differences in the final carious destruction within each species, on the other hand, seems to be influenced greatly by the dietary variable introduced before eruption of the teeth, more so, indeed, than by the oral environment after their eruption.

Table 7.—Influence of the prematernal diet on experimental rat caries*

Experimental conditions before tooth eruption			Experimental conditions after tooth eruption					
Pre-conceptive		Pregnancy lactation	Diet	Period (months)	Molars affected	Areas affected	Caries score	Score per month
Diet	Period (months)							
Sucrose	2	Sucrose	Sucrose	3	2	2	2	
					2	2	2	
					3	4	4	
					3	6	9	
					3	8	9	
					4	5	7	
					4	6	8	
					4	7	9	
					4	8	8	
					4	8	12	
Average	for 10 rats				3.3	5.6	7.0	2.3
Sucrose	4	Sucrose	Sucrose	3	4	8	9	
					4	7	10	
					4	8	13	
					5	8	13	
					5	7	20	
					6	9	12	
					6	9	13	
					7	13	20	
Average	for 8 rats				5.1	8.6	13.7	4.5

*Litters of litter mate (caries-free) mothers.

Table 8.—Summary of effects of different carbohydrates on experimental rat caries (Series B)

Group	No. rats	Ration during dental development		Posteruptive experimental conditions and findings						
		Pregnancy	Lactation	Ration	Age at start (months)	Duration (months)	Carious molars	Carious cavities	Caries score	Score per month
A	5	Stock	Stock	Stock	1	7	0	0	0	0
B	7	Stock	Stock	Whole wheat	1	3	0	0	0	0
C	6	Stock	Stock	Dextrin	1	6	0	0	0	0
D	12	Stock	Stock	Sucrose	1–3	3–8	0	0	0	0
E	17	Stock	½ part sucrose	Sucrose	½	4–8	2.7	3.9	5.7	0.9
F	4	Sucrose*	Sucrose	Whole wheat	1	3	0	0	0	0
G	19	Sucrose*	Sucrose	Dextrin	1	3	0.7	0.8	0.8	0.3
H	8	Dextrin*	Dextrin	Dextrin	0	3	0.7	0.7	0.7	0.2
I	14	Dextrin*	Dextrin	Sucrose	1	3	3.0	5.0	7.0	2.3
J	10	Sucrose†	Sucrose	Sucrose	0	3	3.3	5.6	7.0	2.3
K	8	Sucrose*	Sucrose	Sucrose	0	3	5.1	8.6	13.7	4.5

*Mothers started on given ration four months preceding pregnancy.
†Mothers started on given ration two months preceding pregnancy.

During the past year the work has been limited mainly to the rats (Series B); first, because caries of a very satisfactory nature could be produced at will in this animal and, second, because the rat seemed to have some additional experimental advantages over other caries-susceptible rodents: they reproduce well and have been studied extensively.

The experiments of Series B were designed to re-examine and extend the initial observations under best possible control.

Series B.—When one is studying prenatal effects on the development of the offspring, it is impossible to investigate the effect of different diets with true litter mates. However, the caries susceptibility of the animals of a given litter can be compared with that of their parents, that of preceding and succeeding litters (their siblings) and that of the next closest related litters (their cousins). Furthermore, it is necessary to be sure that the start of the posteruptive exposure to the sucrose diet is identical in compared groups. These requirements are fulfilled in the animals compared in Table 6. The results fully confirm the findings of the experiments in Series A.

It is seen from Table 6 that the caries score per month is four to five times greater in those animals whose teeth were formed on the sucrose diet than in animals bred on the stock diet. It is particularly important to note that the oral exposure of the teeth to the sucrose diet

was identical in the compared groups. Little or no caries developed except where the sucrose ration was fed both before and after the eruption of the teeth. In the first place the teeth of the parents (bred on the stock diet) were unharmed by a period of oral exposure to the sucrose diet twice as long as that of their litters. Second, there was a very low caries incidence in the litter mates which were changed from the sucrose to a dextrin or to a whole wheat ration at weaning time. Caries developed in a few months in the litter mates and siblings which were fed continuously the sucrose diet. (The animals selected for illustration in Figure 4 are marked ‡ in Table 6.)

Animals whose teeth were formed completely on the sucrose diet developed severe caries in three months (see rat 223 in Figure 4). Animals placed on the sucrose diet at the stage of final calcification and maturation of their teeth developed caries in four months (rat 96). But the parents, placed on the sucrose ration when mature, developed no caries in six to eight months.

The first series of experiments (Series A) had given rise to the suspicion that not only the prenatal diet but also the "pre-maternal" diet was of importance, that is, the diet of the mother preceding conception of the litter. Following up this possibility, litter mate mothers were fed the sucrose diet for two and four months, respectively, preceding mating as well as during pregnancy. The caries scores of their litters are compared in Table 7 and show a caries-score ratio of about 1:2. This interesting suggestion should be investigated by a long term experiment on succeeding litters from the same mothers. The influence of the pre-maternal diet on the health of the offspring is not known to have received much experimental study before. If confirmed, it would make efforts toward mass prevention of caries a long term project.

In Table 8 is a comparison of all groups of rats of Series B. Primarily, it serves to confirm the previous findings on a larger scale. The most important additional finding recorded in this table is also the most recent one, namely,

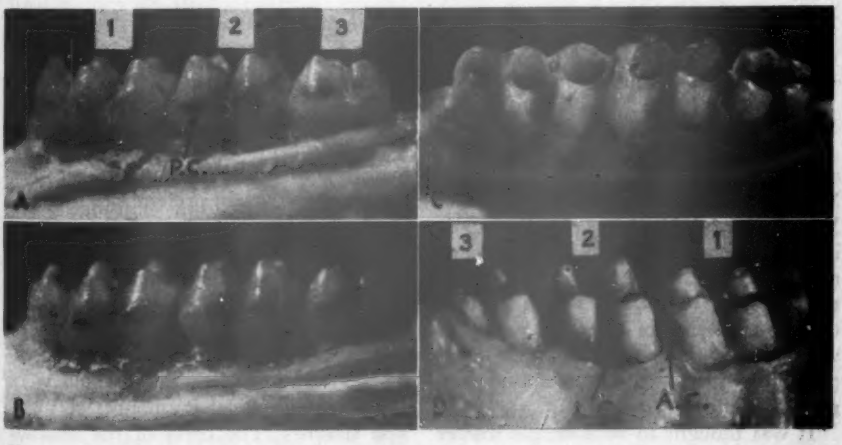

Fig. 2.—Lingual aspect of the maxillary molars of hamsters showing the development of smooth surface caries. The animals were placed on the purified diet after the first molar had erupted, while the second and third molars were still inside the jaw. The latter teeth had most caries, but least exposure to the sucrose ration in the oral cavity. P. C.: Precaries. A. C.: Approximal caries. L. C.: Lingual caries

that observed in Groups H and I. These groups consist of three litters born to mothers subsisting on the purified ration, except that dextrin instead of sucrose served as the carbohydrate fraction. At weaning time litter mates were divided in two groups, one of which (1) was transferred to the sucrose ration.

It is noted that this group developed a caries frequency comparable to rats bred on the sucrose diet. Their litter mates, which were continued on the dextrin ration (Group H), barely developed caries. This throws further light on the caries-producing property of this purified ration. Soluble carbohydrates seem to be potent caries-producing factors after the eruption of the teeth, as already shown in the cotton rat.[8] The maternal and prenatal influence, on the other hand, does not seem to be related to sugar in itself but may be related to the degree of refinement of the carbohydrate fraction. As a refined carbohydrate, sugar, rather than dextrin, usually is referred to as the more important factor to be considered in human caries.

Nevertheless, the animal findings do suggest that a purified ration, complete in all known nutritional essentials but containing a large proportion (67 per cent) of refined carbohydrates, is extremely conducive to caries, provided its ingestion is begun before and continued during tooth development. This appears to hold true whether sucrose or dextrin is the carbohydrate component of the ration fed before eruption of the teeth. Eruption age seems to be one of the critical periods determining the future dental health.

Group D of Table 8 again confirms the fact that the purified ration is not caries-producing for rats whose teeth were formed on the nonpurified diet. The same observation recently has been made in a personal communication by Greep of the Harvard School of Dental Medicine. He fed this ration to rats which, in addition, were exposed to endocrine imbalance and deficient mineral intake after eruption of the teeth. In contrast to this, Figure 5 shows the pathogenesis of the unquestionable lesions produced in our animals which have been fed the purified ration both before and two to six months after eruption of the teeth.

PART II. REINTERPRETATION OF OBSERVATIONS IN OTHER ANIMALS

Research on dental caries has adhered almost exclusively to the traditions of Miller's chemico-parasitic hypothesis.[1] Yet this hypothesis does not explain satisfactorily a number of important experimental observations. It is the purpose of the following section to analyze some of the most notable of these discrepancies with a view to examining their compatibility with the results of the experimental findings just reported.

It was thought to be a simple matter to reproduce caries in animals through carbohydrate fermentation and bacteriologic action in the oral cavity—if that be the all-important prerequisite to caries production. Therefore several attempts have been made to imitate Miller's etiologic requirements in experimental animals.

Guinea Pigs.—Howe[9] fed a group of 18 guinea pigs a diet of milk, rolled oats, carrots and green leaves in which were incorporated excessive amounts of sugar and starches. The teeth of the animals were covered continuously with adhesive masses of these refined carbohydrates and

8. Shaw, J. H., and others, Dental Caries in the Cotton Rat. II. Production and Description of the Carious Lesions. *J. D. Res.* 23:417 (December) 1944.

9. Howe, P. R., Dental Caries. *D. Cosmos* 62:981 (August) 1920.

appeared very dirty. In no animal did any lesions of the teeth develop after nine to twelve months' exposure. Neither could Howe[10] induce caries by the feeding of Bacillus acidophilus and other micro-organisms isolated from carious lesions in man[11] although the oral flora constantly showed their aciduric reaction.

Monkeys.—Extending the work to monkeys,[12] it was shown that the same held true in the primate. They were fed a diet containing considerable amounts of sugar and white flour plus a sticky candy made by boiling cane sugar in water. The presence of aciduric organisms could be demonstrated constantly in the mouth of the animals. The teeth were covered with a mass of adhesive carbohydrates, which could be removed only with difficulty, but cleaning disclosed no effect on the underlying tooth substance.

No caries developed after nine months' feeding except in one animal that suffered from gastro-intestinal disturbance. While the experimental period may have been started too late to affect the teeth pre-eruptively, this negative finding presents strong evidence against the purely environmental effect of a high sugar intake on the teeth. Howe then concentrated on his famous pioneer work on nutritional factors affecting the dental conditions of the primate.

Howe's negative evidence on the importance of the oral environment alone was supported by contemporary and later observations. McIntosh, James and Lazarus-Barlow[13] described an organism isolated from human caries, constantly present in the mouth and capable of producing acids through fermentation of carbohydrate material. But when they tested this organism experimentally by introduction into the mouths of monkeys and rabbits, these investigators failed to produce lesions in the teeth.[14]

The extensive examinations of almost 3,000 monkeys by Schultz[15] showed that caries, if present, affected especially those animals which had been captured when young. This may suggest that the change from a natural diet had occurred early enough to permit a pre-eruptive influence upon the teeth.

Knap[16] tried to simulate human food habits in the monkey but could not induce caries by feeding cooked food containing sugar. In his experiments the teeth could not have been influenced by the "civilized" food before eruption.

Recently, Shaw and others[17] reported a higher than usual incidence of caries in a group of 138 rhesus monkeys which had been fed a high sucrose diet, essentially the one used in the present study with the addition of vitamin C. If the change in the oral environment, associated with the high sucrose diet, was the deciding cause of the carious destruction, then it seems strange that only a few of their monkeys developed visible (obvious) caries before a year or more of exposure to their new oral environment. They observed a remarkable resistance of the enamel to caries as compared to the dentin, once that was reached. It is noted that all the deciduous teeth were erupted before the animals were placed on the sucrose diet and that these teeth remained healthy all through the exposure. Only the permanent teeth, recently erupted, matured

10. Howe, P. R., Food Accessory Factors in Relation to the Teeth. *J. D. Res.* 3:7 (March) 1921, and *J.A.D.A.* 8:632 (August) 1921.

11. Howe, P. R., and Hatch, R. E., A Study of the Micro-organisms of Dental Caries. *J. M. Res.* 36:481, 1917.

12. Howe, P. R., Further Studies of the Effect of Diet Upon the Teeth and Jaws. *J.A.D.A.* 9:55 (January) 1922.

13. McIntosh, J., James, W. W., and Lazarus-Barlow, P., Aetiology of Dental Caries. *Brit. J. Exper. Path.* 3:138 (June) 1922.

14. McIntosh, J., James, W. W., and Lazarus-Barlow, P., Investigation into the Aetiology of Dental Caries. *Brit. J. Exper. Path.* 5:175 (June) 1924.

15. Schultz, A. H., Eruption and Decay of Permanent Teeth in Primates. *Am. J. Phys. Anthropol.* 19:489 (January-March) 1935.

16. Knap, M., Caries bij apen en dietproeven met het cog op caries bij den macacus. *Ned.-Ind. Tand. Tijdschr.* 9:71 and 103 (March) 1941.

17. Shaw, J. H., Elvehjem, C. A., and Phillips, P. H., A Survey of the Incidence of Dental Caries in the Rhesus Monkey. *J. D. Res.* 24:109 (June-August) 1945.

Fig. 3.—Pathogenesis of occlusal and buccal caries of the mandibular molars of hamsters. A heavy layer of secondary dentin is noted both under the initial lesion (above) and the advanced lesion (center). Periodontal destruction also is seen (center and below)

or developed during the experimental period, can have been affected. This assumption has been confirmed in a personal communication. Indeed, 80 per cent of the animals finally developed caries in these teeth after three years. Our findings may suggest that the sucrose diet in this particular case was acting on the development and final maturation of the teeth as well as on the oral environment after their eruption.

Dogs and Rats.—Mellanby[18] failed to produce caries in dogs on soft sticky foods, excessive use of carbohydrates, daily introduction of Lactobacillus acidophilus and suppression of salivary flow. Nearly as negative were her findings in rats. The difficulty of producing caries in the latter animal by high sugar diets and oral micro-organisms has been demonstrated by several authors.

Rosebury and Karshan[19] failed to produce a single lesion in rats fed a synthetic diet containing excessive amounts of fermentable carbohydrates and introduced in the form of an adhesive paste containing L. acidophilus isolated from the human mouth. Indeed, similar aciduric organisms were found as natural inhabitants in the rats' mouths. Furthermore, the animals were exposed to deficiency in the calcifying property of the diet and to a large sugar intake as well as pulpal injury. Yet no carious lesions developed in rats kept under such experimental conditions from weaning time to 3 months of age. This corresponds well with the duration of our posteruptive feeding but differs in so far as the Rosebury-Karshan experiment was started too late to affect the formation of the teeth.

Klein and Harris[20] found organisms resembling the L. acidophilus described by the Bunting group in connection with human caries in the mouth of normal stock rats. The caries freedom of these rats adds further doubt to the causative sufficiency of these micro-organisms in producing caries.

Lilly[21] extended Rosebury and Karsh-

18. Mellanby, May, Diet and the Teeth. An Experimental Study. Part II. Medical Research Council Report 153. London: His Majesty's Stationery Office, 1930.

19. Rosebury, Theodor, and Karshan, Maxwell, Studies, in the Rat, of Susceptibility to Dental Caries. I. Bacteriological and Nutritional Factors. *J. D. Res.* 11:121 (February) 1931.

20. Klein, Henry, and Harris, M. M., A Note on the Presence of Aciduric Bacteria in the Mouths of Rats. *J. D. Res.* 11:149 (February) 1931.

21. Lilly, C. A., Failures to Produce Experimental Dental Caries in the White Rat with High Carbohydrate Diet and Bacillus Acidophilus or with Vitamin D Deficiency. *J. Nutrition* 5:175 (March) 1932.

an's experimental period to twelve months with the same negative result. No caries developed on a synthetic diet containing 63 per cent sucrose plus triweekly oral inoculations of a pure culture of L. acidophilus. As in the previous case, his approach differed from ours in so far as his rats were too old to permit an influence on the formation of their molars by the sucrose ration.

Jackson[22] has reported an experiment which serves as a very good control to our experiments. Like ours, his rats were of the Long-Evans strain of the Mus norvegicus, and he fed them a similar purified diet except that it contained even higher amounts of sucrose (up to 80 per cent). He placed the animals on this diet at weaning time and kept them on it for as long as seven months. The rats remained normal in health, vigor and appearance, and no difference was found between the teeth of the experimental group and the control group which was fed a sugar-free diet. Both groups maintained good health. Under these conditions (after normal tooth formation) it is evident that "high sugar diets for long periods are not necessarily injurious to the teeth."

There are two interesting rodents the use of which has opened new possibilities in experimental caries production lately, namely the Syrian hamster (Cricetus auratus)[23] and the cotton rat (Sigmondon hispidus hispidus).[8] Both are extremely susceptible to caries on various types of diets, particularly high carbohydrate diets, and would seem particularly valuable in the study of environmental factors involved in the caries process.

Aside from the two latter species,[24] which are not known as well as the others, caries is not produced easily in experimental animals by adhesive sugar pastes alone or in combination with oral inoculation of L. acidophilus isolated from human caries, by the constant existence of an aciduric oral reaction or the excessive feeding of fermentable refined carbohydrates for long periods after the eruption of the teeth. The chemicoparasitic hypothesis does not seem to suf-

Fig. 4.—Comparison of caries susceptibility of parents (bred on stock diet), first litter (placed on stock diet during lactation) and second litter (bred on purified ration). After eruption the teeth were exposed to a high sucrose ration for a period of eight months (mother), six months (father), four months (first son) and three months (second son), respectively

22. Jackson, C. M., The Effects of High Sugar Diets on the Growth and Structure of the Rat. *J. Nutrition* 3:61 (July) 1930.

23. Arnold, F. A., Jr., The Production of Carious Lesions in the Molar Teeth of Hamsters (C. auratus). *Pub. Health Rep.* 57:1599 (October 23) 1942.

24. Hamsters and cotton rats are slower in dental development than the white rat. Consequently, their molar development and maturation, at least in the third molar, may be affected even after weaning time.

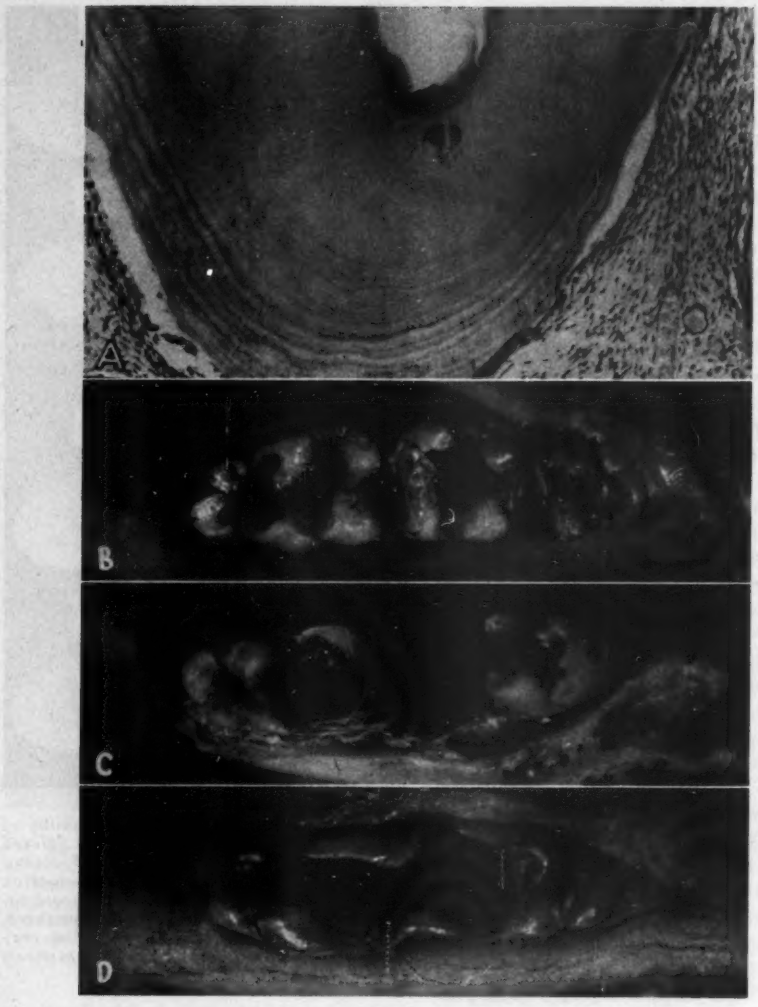

Fig. 5.—Pathogenesis of caries in rats placed on the purified, finely powdered (sucrose) ration before tooth eruption and kept on that diet for a period of two (A) to six (D) months after eruption of their molars. Invasion of the dentinal tubules and secondary dentin formation can be seen in the initial stage (A). Fractures are not in evidence even after considerable undermining of the enamel (B)

fice. It is suggested that previous failures to produce caries in various animals, including the monkey, by high sucrose diets may have been due to the fact that the experiments employed too old animals, did not extend to the second generation or covered too short periods within one generation to overcome the caries resistance of the species, strain or teeth in question.

COMMENTS AND CONCLUSIONS

We know of no earlier experiments which have shown that prolonged intake of refined carbohydrate diets over more than one generation, which would be a fitting parallel to the experience of civilized man today, is conducive to the production of dental caries. To some extent, such a parallel seems to have been attained by the experimental approach of the present investigation. The results do not appear inconsistent with the previous failures to produce experimental caries by high sugar diets when these earlier studies (Part II) are reinterpreted in the light of a developmental as well as environmental effect of such diets.

Purified Ration.—The mechanism of this developmental influence is not known. In the experiments reported here, the purified caries-producing ration was complete in all known nutritional essentials. It is particularly remarkable that it contained twice as high content of vitamin A and D as the stock diet. The general health of the animals was excellent. The growth of animals fed the sucrose diet was at least as good as that of the animals on the stock diet.

The reproduction was very satisfactory in the rats and mice. The hamsters were less satisfactory in so far as they have a tendency to eat their litters. It has been reported that rats fed highly purified diets have not cared for their young, have not had enough milk or have been unable to raise their litters satisfactorily.[25, 26] The large sucrose fraction of such diets has been suspected as the cause of these difficulties. Nevertheless it has been possible to breed rats for five generations on diets containing 66 per cent refined carbohydrate, 33 per cent as sugar.[27] Indeed, rats have grown and reproduced well on purified rations with as high as 80 per cent sucrose content.[27] The above differences may have been related to the adequacy of the diet.

Prenatal Influence.—It does not seem likely that the prenatal influence on the teeth of the animals can have been related to the relatively large intake of sugar in itself, to the physical property of the diet or to the direct shortage of any known nutritional essentials.

Unrecognized Factors.—The possibility may be suggested that some unrecognized mechanism or factors, possibly in the nature of trace elements, have played a part in deciding the caries resistance of the teeth. As far as fluorine is concerned, no evidence of dental fluorosis was observed in any groups of our animals such as reported by Dale and others[28] in hamsters fed a rabbit chow diet contaminated with fluorine.

The literature suggests that the inhibitory effect of fluorine on experimental caries is most marked if given *after* tooth eruption in amounts of 100 to 250 p.p.m. and that the effect appears relatively limited if given only during tooth development[29] as in this study. More work is needed on this phase. In the meantime one cannot disregard completely the possible operation of this element or others, the importance of which is still unknown.

After reviewing earlier investigations on the nutritional importance of various

25. Whitnah, C. H., and Bogart, R. J., Reproductive Capacity of Female Rats as Affected by Kinds of Carbohydrates in the Ration. *J. Agric. Res.* 53: 527, 1936.

26. Winnek, P. S., and Smith, A. H., Studies on the Role of Bromine in Nutrition. *J. Biol. Chem.* 121: 345 (October) 1937.

27. Fisher, D. P., The Effect of High Sugar Diets. *M. Rev. of Rev.* 38:693 (December) 1932.

28. Dale, P. P., Lazansky, J. P., and Keyes, P. H., Production and Inhibition of Dental Caries in Syrian Hamsters. *J. D. Res.* 23:445 (December) 1944.

29. Hodge, H. C., and Sognnaes, R. F., Experimental Caries and a Discussion of the Mechanism of Caries Inhibition by Fluorine. In *Dental Caries and Fluorine.* Washington: American Association for the Advancement of Science, 1946, p. 53.

trace elements, the author is impressed by the fact that a total purification of synthetic diets has not been possible without great limitation to its general adequacy and digestibility. As a result animals have not lived long enough to make possible a study of effects of a prolonged depletion into second generations. Yet it has been concluded that several specific trace elements are unessential to the well-being and general health of animals. This does not prove the unimportance of such elements, singly or combined, to the prolonged health of all tissues over several generations. As far as the tooth enamel is concerned, it has indeed lower ability than most tissues to recover later whatever was missing during its development. The hypothesis of a nutritional depletion resulting from food purification deserves further experimentation. In surveys[30-31] of human caries, it is desirable to consider the part played by an excessive ingestion of refined carbohydrates *before* tooth eruption.

1. The findings indicate that hamsters, rats and mice are susceptible to experimental caries when fed a purified, finely powdered ration, complete in known nutritional essentials and high in refined carbohydrates, particularly if its ingestion is begun during tooth formation.

2. The caries susceptibility appears to be influenced by an unrecognized mechanism, a nutritional factor or combination of factors operating before eruption of the teeth from conception to maturation of the offspring and their individual teeth.

3. It is possible that the long suspected relation between dental caries and the excessive consumption of refined carbohydrates may be partly in the nature of an unrecognized indirect influence on the quality of the developing teeth and that the effect may be accentuated through generations.

30. Sognnaes, R. F., A Possible Role of Food Purification in the Etiology of Dental Caries. *Science* 106: 447 (November 7) 1947.

31. Sognnaes, R. F., Analysis of Wartime Reduction of Dental Caries in European Children. *Am. J. Dis. Children:* In press.

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Additional Power for Food, Drug and Cosmetic Act. —In one five-week period the Federal Food and Drug Administration seized 1,667,884 pounds of food unfit for consumption from storage warehouses after interstate shipment. Confiscation of this food was made possible by enactment of an amendment to the Federal Food, Drug and Cosmetic Act which permits seizure of unfit edibles from storage after interstate shipment. Previously, the Administration could condemn food only when contamination had occurred before or during shipment.

The material seized included rice, cereal products, sugar, spices, nuts, raisins, glacé fruit, cheese and other food attractive to insects and rodents. The Administration also condemned canned and frozen foods that had deteriorated after shipment.—*Abstracted from a release of the Food and Drug Administration, Federal Security Agency, dated August 4, 1948.*

THE FEDERAL GOVERNMENT'S PART IN MEDICAL AND DENTAL RESEARCH

M. D. Huff, D.D.S., Atlanta, Ga.

WITHIN the last year the President's Scientific Research Board, through its chairman, John R. Steelman, Ph. D., has issued a five volume report on "Science and Public Policy."

All five volumes may be purchased from the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D.C.

Vol. 1: *A Program for the Nation*
Vol. 2: *The Federal Research Program*
Vol. 3: *Administration for Research*
Vol. 4: *Manpower for Research*
Vol. 5: *The Nation's Medical Research*

This discussion is confined almost entirely to volume 5, *The Nation's Medical Research.*

President's Scientific Research Board

Dr. Steelman, in his letter of transmittal to President Truman on October 17, 1947, stated that the report dealt with medical and allied sciences. The report is predominantly medical. For instance, dental or oral disease and research are scarcely mentioned.

However, before discussing and reviewing *The Nation's Medical Research* it would be well to examine the mechanism by which the report was created. On October 17, 1946, President Truman issued Executive Order 9791, establishing the President's Scientific Board with Dr. Steelman as its chairman. With the advice and assistance of this board, he was directed to survey broadly the status of research and research personnel, governmental and all other. The President's Scientific Board was composed of the top level of executives of the federal government who would be concerned with research, research personnel and the financing thereof.

The Board consisted of the chairman, who was at that time the director of War Mobilization and Reconversion; the secretaries of War, Navy, Interior, Agriculture and Commerce; the administrators of the Federal Loan Agency, the Federal Security Agency and the Veterans Administration; chairmen of the Federal Communications Agency, the National Advisory Committee for Aeronautics, the Atomic Energy Commission and the Tennessee Valley Authority; the director of the Office of Scientific Development and Research; the secretary of the Smithsonian Institution, and an executive secretary. This impressive array of federal executives appointed alternates to act in their stead.

Board of Alternates

The executive secretary of the Board, J. Donald Kingsley, Ph.D., also served as chairman of this Board of Alternates, which consisted of the top administrators of research in the federal government, as follows: the directors of the National Bureau of Standards, of the Research and Development Division of the General Staff of the War Department, of the Agriculture Research Administration, of

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Immediate past-chairman of the Research Commission (now the Council on Dental Research), American Dental Association.

the Commerce Department of the Tennessee Valley Authority, of the Federal Works Agency, of Aeronautical Research of the National Advisory Committee for Aeronautics, of the Geological Survey, and of the Programs Division of the Joint Research and Development Board; the assistant secretary of the Navy for Air; the chief of the Office of Naval Research; the special assistant to the administrator of the Federal Security Agency, the general manager of the Atomic Energy Commission; one of the commissioners of the Federal Communications Commission; one member of the Medical Division of the Veterans Administration, and the administrative officer of the Office of Rubber Reserve of the Reconstruction Finance Corporation.

Staff of Investigators

Under this Board of Alternates was a staff who made the investigations and prepared the reports. Primary responsibility for the fifth volume, *The Nation's Medical Research,* rested with Dr. Howard M. Kline who served the Board as its adviser on medical research. Dr. Kline had the assistance of a subcommittee on Medical Research. This committee of seventeen, most of whom were physicians concerned with federal medical research, had no dental members. This is the way that dental matters usually are neglected when physicians administer them. Is there any logical reason why some capable dental officer from at least one of the federal services should not have been appointed to this committee? He surely could have been of public service in presenting, advising and assisting on dental research.

The United States Public Health Service, through its research arm, the National Institute of Health, recognized the necessity for an autonomous consideration of dental research when it created a Dental Study Section. This Dental Study Section makes recommendations to the National Advisory Health Council relating to requests for grants-in-aid to dental research. The National Dental Research Act hereinafter discussed became effective on July 1, 1948. As it calls for the formation of a National Advisory Dental Research Council, it is assumed that the Dental Study Section of the National Advisory Health Council will be either disbanded or absorbed by the new Dental Research Council.

The seemingly extraneous details concerning the genesis of a governmental administrative report are given as an illustration of the way such reports usually depend ultimately on one individual, in this instance Dr. Kline. Dr. Kline holds a Ph.D. degree in public administration from Syracuse University. His selection as adviser on Medical Research was wise as his report is factual and judicial. Unfortunately dental research, in or out of the federal structure, is scarcely mentioned in the 118 page report. Therefore a similar type of report on the nation's dental research is needed as a basis for the formulation of a national policy for dental research.

Laboratories

The federal government is now seriously involved in research in its own and in outside laboratories. Federal support of research in nongovernmental laboratories by contract and through grants-in-aid is increasing in importance to such an extent that it may dominate the nation's research to an unprecedented degree. If dentistry is not alert, if it does not plan and administer the dental phases of such a research program, then it will neglect one of its primary public duties. What is the alternative? To allow physicians to administer it as at present? If dentistry does permit dental research to be directed by physicians, then the research phase of the public's dental health problems will suffer, as the physi-

cian is not usually even remotely interested in dental research. If he has monies to administer for research the physician naturally tends to spend them on problems in which he is interested. This undoubtedly accounts for the status of dental research in the federal government through the years.

Status of Federal Research

Millions of dollars have been spent for medical research by the federal agencies, but only puny sums have been expended on dental research. Some examples follow:

For the fiscal year 1946-1947, the War Department spent $6,040,000 for research and development in medical and allied sciences (pp. 15 and 16).[1] Out of this vast sum, apparently only one dental study or project was financed. This research was on the etiology of dental disease (table 7, p. 84).

The Navy Department spent $5,940,000 for medical research in the same period. Four dental research projects were supported, three of them on the causation of dental disease and one on its epidemiology (table 6, p. 83). Two of these investigations were conducted in Naval laboratories and two in nongovernmental laboratories.

The U. S. Public Health Service of the Federal Security Agency spent $12,585,000 on medical research during fiscal year 1946-1947. Its twelve dental research projects are listed in table 5, page 82. Three of these are in etiology, one in diagnostic tests, two in epidemiology, one in chemotherapy, one in other therapy, two in environment control, one in service and facilities and one in a miscellaneous classification.

Some other governmental agencies have small budgets for medical research. These include the Tennessee Valley Authority, Civil Aeronautics Authority and other divisions of the Federal Security Agency such as the Food and Drug Administration, Children's Bureau and St. Elizabeth Hospital. No dental projects are included.

The Veterans Administration spent $2,520,000 during fiscal year 1946-1947, but no dental items are reported in the volume (p. 106).

Thus out of a total expenditure of $28,000,000 by the federal government for medical research during fiscal year 1946-1947, there appear to be seventeen dental researches so financed. Unfortunately there is no dollar breakdown on these, but one can hazard a good guess that a comparatively petty sum was spent on dental projects.

The author of *The Nation's Medical Research* was cognizant of this situation. For instance, on page 75 is the statement:

> Heart disease, for example, is the most frequent cause of death in the United States, but very little Federal research is directed toward a solution of the unsolved problems associated with cardiovascular ailments. Many conditions occupy a far more important place in the roster of illnesses and deaths than in the list of research projects. Among them are dental disease, accidents, rheumatism and allied diseases, and influenza.

On page 88 the author says:

> The small group of projects on dental and oral disease sponsored by the Federal agencies reflects the general neglect of dental research, and the need for training investigators in this field.

Under "Conclusions and Recommendations—a Summary" there appears the following (p. 116):

> Mental diseases and dental diseases which are widely prevalent in the general population and in the special population groups served by the Army, the Navy, and the Veterans' Administration, have received relatively little attention in Federal medical research

1. All tables and page numbers mentioned in this article refer to volume 5 of the report on "Science and Public Policy."

programs. The acute shortage of trained personnel in psychology, psychiatry, and dental research makes authorized expansion in these fields especially difficult.

Except for these statements there are no specific recommendations as to the present or projected status of research in all phases of dentistry in the federal structure. On page 88 under the caption "Dental Diseases" are four paragraphs, two of which give data on research on dental materials at the National Bureau of Standards in cooperation with the Research Commission (now the Council on Dental Research) of the American Dental Association. No mention is made of the American Dental Association research fellowship at the National Institute of Health.

Since the Steelman report was issued, Public Law 755, known as the "National Dental Research Act" was enacted by the Eightieth Congress. This law amends the Public Health Service Act to provide specifically for the promotion of dental research within the federal structure and in the nation generally under private auspices and state and local governments. The law provides the United States Public Health Service with $2,000,000 "for the erection and equipment of suitable and adequate buildings and facilities for the use of the National Institute of Dental Research in carrying out the provisions of this act." In addition, $750,000 is to be appropriated annually, beginning with the fiscal year ending June 30, 1949. This $750,000 is to be used to staff and maintain the National Institute of Dental Research, for grants-in-aid to dental research and for grants-in-aid to any public or nonprofit institution " . . . for training, instruction, and traineeships in matters relating to the diagnosis, prevention, and treatment of dental diseases and conditions . . . "

The enactment of this law, to the everlasting credit of the American Dental Association and its Committee on Legislation, who sought unremittingly since 1940 for its passage, constitutes an achievement in dentistry's progress that is second to none.

Nonfederal Research

Dental research does not command the wide popular attention nor receive the public support that is given to medicine. In the first place, dental illnesses are almost always chronic and infrequently are the direct cause of death. Caries and pyorrhea alveolaris do not have the dramatic appeal of heart failure or cancer. Those who have money to donate to research usually give it for investigation of a disease which caused the early death of a dear relative or friend. This probably explains why so much of the support of dental research, little though it is, has been provided by dentistry itself and not by public benefactors or foundations.

Dental schools are woefully weak in research. There are exceptions, of course, but by and large the foregoing statement holds true. This is because dental education is conducted on a financial shoestring consisting largely of tuition fees and income from the clinics. There is no money for research. But even more basic is the fact that too few administrators in dental education realize the necessity for research or its impact on teaching, education, professional advancement and public health. Usually where there is a will there is a way, which is another way of saying that dental research will take a spurt if research-minded administrators are in charge of dental educational institutions.

What Should Be the Program?

How can dentistry further dental research and see to it that a reasonable proportion of public monies is expended for research in dentistry?

1. The Congress and the President realized that there was great public need for

dental research when they made the necessary provisions in a public law. The need is also attested by the fact that the public supports half as many dentists as it does physicians. Even though dental ailments of the public are treated by half as many practitioners as all other parts of the body combined, there is still a tremendous backlog of untreated dental disease. It is a well known statistical fact that only a comparatively small segment of the public receives needed dental care. Research in prevention, control and improved therapeutic measures can be expected to contribute most to the alleviation of dental illnesses. An alternate method would be to subsidize by public funds the education and practice of large numbers of dentists. This is impractical because it offers no hope in solving the problem of dental illnesses. Surely there is a real public need for dental research supported by public funds, which now, thanks to the American Dental Association, are made specifically available for that purpose.

2. There is an acute shortage of personnel trained in dental research. It will be necessary to train personnel for dental research by some such system as the fellowship plan and grants-in-aid. The new law provides for these.

3. A survey of the nation's dental research, governmental and nongovernmental, should be made by the International Association for Dental Research, the American College of Dentists, the Dental Study Section of the National Advisory Health Council or the yet to be formed National Advisory Dental Research Council. A survey by more than one group might be desirable. The survey should contain definite recommendations for furthering dental research and for a national policy for dental research.

4. An advisory committee of governmental and nongovernmental scientists whose primary interest is in dental research should be established at once, now that the proposed Interdepartmental Committee for Scientific Research (federal) has been appointed by President Truman. The proposed Committee on Dental Research could well serve as a subcommittee of the Interdepartmental Committee rather than as a section of a subcommittee on medical research. The chairman of the Interdepartmental Committee is empowered to appoint such subcommittees by President Truman's executive order. In other words, dental research needs independent recognition in the federal government, and it needs scientists trained in dental research to plan, direct and administer it. It is sincerely hoped that the United States Public Health Service will administer the National Dental Research Act (Public Law 755) in accordance with such a philosophy.

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Use of 4 Per Cent Procaine.—Procaine hydrochloride is used in solutions of 0.5 to 4 per cent, but a 2 per cent solution with a vasoconstrictor is most suitable for conduction anesthesia and infiltration. While 4 per cent procaine solutions are listed in *A.D.R.* their routine use is not indicated because of the increased potential toxic hazards. Such stronger solutions are indicated only where anesthesia is difficult or impossible to obtain with the usual 2 per cent concentration. —*Accepted Dental Remedies, edition 14, page 47.*

COUNCIL ON DENTAL RESEARCH

DISCOLORATION OF INLAYS, DENTURES AND JACKET CROWNS

STAINING or discoloration of restorations and dentures is annoying to the patient and embarrassing to the dentist. The Research Commission is interested in this problem and offers some suggestions which should help the dentist avoid it.

Precious Metal Alloys

The Research Commission recently received a verbal inquiry from a dentist who was puzzled by several instances of discoloration or darkening of inlays.

It is impossible to state definitely the reason for such discoloration without knowing all the influences to which the alloy has been exposed. However, one possible cause of discoloration is a contaminated pickling solution; for instance, a solution which has been used to remove zinc and copper cements from porcelain facings or teeth. Such a solution would have salts of base metals dissolved in it. If an inlay containing precious metals is held with iron tweezers during flaming and if the tweezers are in contact with the inlay at the time of immersion in the contaminated acid bath, base metal will be deposited on the inlay.

A copper plating would be one of the worst that could be given to the inlay. Even if this plating subsequently is polished off, some copper usually remains in the pores of the casting. This furnishes focal spots at which discoloration begins again, and in time the whole surface of the inlay may be stained.

Explanation of this mechanism will be found on page 81 of the book *Einfuhrung in die Werkstoffkunde für Zahnarzte* by Karl Falck, published in 1937 by J. F. Lehmans Verlong, Muchen, Berlin. A similar explanation was presented by R. C. Brumfield and C. E. Horner in their paper, "Occasional Discoloration of High Precious Metal Content Castings," presented before the dental materials group of the International Association for Dental Research at Chicago on June 21, 1947.

A simple way to avoid discoloration of precious metal alloys in the mouth is to use a clean pickling solution and not to submerge the heated casting while it is in contact with iron tongs. The casting should be released above the pickling solution so that the tongs and inlay will not be in contact at the moment of immersion.

Resin Dentures

Some dentists have been troubled by discoloration of dentures between the neck of the tooth and the resin base. The Research Commission would like to receive samples of such dentures together with as much of the history of the dentures as can be obtained. The history should include the age of the denture, the trade brand name of the resin from

which it was made, any of the processing details that are available and any habits of the patient which might contribute in some way to this discoloration. The dentures, together with any available history, should be forwarded to Dr. C. B. Hall, Secretary of the Council on Dental Research, 1835 Eye St., N. W., Washington 6, D. C.

Acrylic Resin Restorations

Acrylic resins will shrink in air and expand when placed in water. Therefore, a restoration should not be allowed to dry out, or if it does dry out the resin should be placed in water at least one day before it is cemented into place or before adjusting occlusion.

There is a possibility that the discoloration sometimes found around the necks of jacket crowns may have been caused by cementing a dried-out crown in place, after which the crown expanded by absorbing moisture. Thus a crevice is formed that permits the ingress of debris and dissolution of the cement, with discoloration resulting.

APPLICATION OF KNOWLEDGE OF DENTAL MATERIALS IN DENTAL PRACTICE

DENTISTS may obtain an excellent résumé of the practical application of the research work on dental materials which is carried out at the National Bureau of Standards in cooperation with the Research Commission of the American Dental Association. The information is available in National Bureau of Standards Circular C433, *Physical Properties of Dental Materials,* by Wilmer Souder and George C. Paffenbarger, published February 6, 1942.

To quote from the authors:

> The dentist will find explanations for some of the many difficulties which confront him daily, such as excessive expansion of amalgam, shrinkage of gold inlays and solubility of cements. He will find technics suggested that will reduce the number of these difficulties and give him a greater confidence in his ability to render to his patients the best dental service possible under the present development of the science and art of restorative dentistry.

National Bureau of Standards Circular C433, a cloth bound, 230 page volume, is obtainable from the Superintendent of Documents, Washington 25, D. C., for $1. Remittance should be made either by coupons (obtainable from the Superintendent of Documents in sets of 20 for $1 and good until used), or by check or money order payable to the "Superintendent of Documents, U. S. Government Printing Office" and sent to him with the order.—*C. B. Hall, Secretary.*

COUNCIL ON DENTAL THERAPEUTICS

COUNCIL LISTS PRODUCTS FOR "ACCEPTED DENTAL REMEDIES"

THE Council on Dental Therapeutics of the American Dental Association announces the inclusion of the following products in the list of *Accepted Dental Remedies:*

Astringents, Hemostatics and Vasoconstrictors[1]

Oxidized Cellulose — Hemo-Pak.— Hemo-Pak oxidized gauze or cotton, supplied in the form of sterile gauze packing strips or cotton pads, is prepared by the nitrogen dioxide oxidation of surgical gauze or cotton by the method of Kenyon and his associates[2, 3] which converts cellulose into cellulosic acid. The cellulosic acid is a polyanhydroglucuronic acid having a minimal carboxyl content of 16 per cent. It has a nitrogen content not in excess of 0.5 per cent derived from the nitrogen dioxide used in its preparation. The final product, as supplied for surgical purposes, has a formaldehyde content not in excess of 0.5 per cent derived from the formaldehyde used in its sterilization.

Actions and Uses: Hemo-Pak Hemostatic Absorbable Gauze Packing Strips, ½ inch by 2½ yards, are useful in oral surgery. They are especially valuable in checking obstinate bleeding after tooth extraction. For this purpose the gauze is gently packed into the cavity and pressure is applied for two to three minutes, until the gauze has begun to combine with the hemoglobin of the blood and turn black. These strips also may be employed as a hemostatic agent in other surgical procedures about the oral cavity. Hemo-Pak Hemostatic Absorbable Cotton Pads, 6 by 2 inches, are another form of the material that is employed, with equal success, by the same technic as that described above.

Dosage: The amount of gauze or cotton used varies with the circumstances of the individual case. As a general rule, only the minimal amount required to control hemorrhage should be used. The hemostatic effect of oxidized cellulose is greater when it is applied dry; therefore, for surgical applications, moistening with water or saline solution is *not* recommended. In the event that it is desired to remove the gauze or cotton before dissolution is complete, removal can be facilitated by irrigation with a saline or a mildly alkaline solution. When properly used, oxidized cellulose may be closed in a clean wound without drainage. In contaminated or infected wounds, closure without drainage is hazardous.

Hemo-Pak Hemostatic Absorbable Gauze Packing Strip, ½ inch by 2½ yards in sealed tubes.

Hemo-Pak Hemostatic Absorbable Cotton Pad, 6 by 2 inches in sealed tubes.

Manufactured by Johnson & Johnson, New Brunswick, N. J.

Tests for identity and purity have been published by the American Medical Association.[4]

1. *A.D.R.*, ed. 14, p. 103.
2. Yackel, E. C., and Kenyon, W. O., Oxidation of Cellulose by Nitrogen Dioxide. *J. Am. Chem. Soc.* 64: 121 (January) 1942.
3. Unruh, C. C., and Kenyon, W. O., Investigation of the Properties of Cellulose Oxidized by Nitrogen Dioxide. *J. Am. Chem. Soc.* 64:127 (January) 1942.
4. Council on Pharmacy and Chemistry. *J.A.M.A.* 136:809 (March 20) 1948.

Anesthetics—Local[5]

Procaine HCl 4%, Epinephrine 1:50,000—Novocol: Each cubic centimeter is stated to contain procaine hydrochloride, 0.04 Gm.; epinephrine, 0.00002 Gm.; sodium bisulfite, 0.002 Gm., and distilled water, q.s. Marketed in cartridges, 2.3 cc. Manufactured by Novocol Chemical Mfg. Co., Inc., Brooklyn.

Procaine HCl 2%, Epinephrine 1:25,000: Each cubic centimeter is stated to contain procaine hydrochloride, 0.02 Gm.; epinephrine, 0.00004 Gm.; sodium chloride, 0.005 Gm.; sodium bisulfite, 0.0019 Gm.; in distilled water. Marketed in 2.3 cc. cartridges.

Procaine HCl 4%, Neo-Synephrine 1:2,500: Each cubic centimeter is stated to contain procaine hydrochloride, 0.04 Gm.; Neo-synephrine hydrochloride, 0.0004 Gm.; sodium bisulfite, 0.002 Gm.; in distilled water. Marketed in 2.3 cc. cartridges. Distributed by Holtz Chemical Co., Philadelphia.

Procaine HCl 4%, Neo-Synephrine 1:2,500: Each cubic centimeter is stated to contain procaine hydrochloride, 0.04 Gm.; Neo-synephrine hydrochloride, 0.0004 Gm.; sodium chloride, 0.005 Gm.; sodium bisulfite, 0.0019 Gm.; in distilled water. Marketed in 2.2 cc. cartridges. Distributed by the Premier Dental Products Co., Philadelphia.

Nutritional Factors[6]

Basic Formula Vitamin Tablets: Each tablet is stated to contain thiamine hydrochloride, 10 mg.; riboflavin, 5 mg.; niacinamide, 150 mg.; ascorbic acid, 150 mg. Distributed by E. R. Squibb & Sons, New York. In bottles of 30, 100, 250 and 1,000.

5. *A.D.R.*, ed. 14, p. 39.
6. *A.D.R.*, ed. 14, p. 136.

Acid Ascorbic USP—Mallinckrodt: A brand of ascorbic acid, U.S.P.

Niacin USP—Mallinckrodt: A brand of nicotinic acid, U.S.P.

Niacinamide USP—Mallinckrodt: A brand of nicotinamide, U.S.P.

Thiamine Hydrochloride USP—Mallinckrodt: A brand of thiamine hydrochloride, U.S.P. Distributed by Mallinckrodt Chemical Works, St. Louis.

Antibiotics and Antiseptics[7]

Crystalline Penicillin G Procaine in Oil: Each cubic centimeter of suspension contains (in vials): crystalline penicillin G procaine, 300,000 units; Tween 80 (sorbitan monooleate polyoxyalkylene derivative), 1/64%; in sesame oil. Marketed in 10 cc. vials. Each cubic centimeter of the suspension contains (in cartridges): crystalline penicillin G procaine, 300,000 units; in sesame oil containing 2% aluminum monostearate. Marketed in B-D 1 cc. cartridges with B-D Disposable Cartridge Syringe. Distributed by Abbott Laboratories, North Chicago, Ill.

Duracillin in Oil (Procaine Penicillin G in Oil)—Lilly: A suspension of 300,000 units of procaine penicillin G in 1 cc. of sesame oil. Marketed in 1 cc. and 10 cc. rubber stoppered ampules. Distributed by Eli Lilly and Company, Indianapolis.

Admission to *Accepted Dental Remedies* means that the product was found to conform to the rules of the Council when it was accepted. Accepted products are reconsidered periodically. The files of the Council contain information on many drugs and dental cosmetics, and inquiries are welcomed.—*Donald A. Wallace, Secretary.*

7. *A.D.R.*, ed. 14, p. 59.

PRELIMINARY COMMENTS ON DENTAL PRODUCTS

IN ORDER to provide helpful information promptly, the Council on Dental Therapeutics has authorized the publication of preliminary comments concerning commercial preparations which are within its scope. The comments are limited to clear-cut facts and references to previously published information and written opinions. The Council will authorize the publication of comprehensive status reports at a future time if they appear to be needed and will accept those products which, on investigation, are found to be eligible for inclusion in *Accepted Dental Remedies* in accordance with its rules.

The products listed below have not been accepted by the Council.

Dicaldimin is a vitamin-mineral mixture in capsules advertised for supplementing the diet during pregnancy and lactation. Each capsule is stated to contain dicalcium phosphate (anhydrous), 725 mg.; vitamin D (viosterol), 500 units; ferrous sulfate, 50 mg.; thiamine HCl, 3 mg.; riboflavin, 3 mg., and nicotinamide, 12 mg. Seven hundred and twenty-five milligrams of anhydrous dicalcium phosphate would provide 214 mg. of calcium and 165 mg. of phosphorus. Fifty milligrams of ferrous sulfate would provide 10 mg. of iron.

For the total daily dietary needs of a 123 pound (55.8 Kg.) woman during lactation or during the latter half of pregnancy, the Food and Nutrition Board of the National Research Council[1] recommends 1.5 to 2.0 Gm. of calcium, 400 to 800 units of vitamin D, 15 mg. of iron, 1.8 to 2.0 mg. of thiamine, 2.5 to 3.0 mg. of riboflavin, and 18 to 20 mg. of nicotinamide. The Food and Drug Administration[2] of the Federal Security Agency has estimated that the minimum daily requirement of phosphorus for pregnant or lactating women is 1.5 Gm.

One capsule of Dicaldimin a day would furnish about one-ninth of the total amounts of calcium and phosphorus which the patients for whom the product is designed should receive. One capsule a day would supply roughly two-thirds of the recommended allowances of iron and nicotinamide, the entire allowance of vitamin D and riboflavin and a slight excess of thiamine.

The relatively insignificant proportions of calcium and phosphorus in Dicaldimin are characteristic of vitamin-mineral preparations in capsule and tablet form. It is a simple matter to incorporate the daily requirements of the common vitamins in a single compact dose but the daily requirements of calcium or phosphorus are too large to include in an easily-swallowed capsule or tablet.

For a detailed discussion of nutritional factors, see *Accepted Dental Remedies.*[3]

Dicaldimin with Vitamin C (Capsules) are stated to contain 50 mg. of ascorbic acid in addition to the Dicaldimin formula. The recommended daily allowance of ascorbic acid is 100 mg. during the latter half of pregnancy and 150 mg. during lactation.[1]

Nine-Vitamin Capsules — Bonded Brand: Distributed by the William A. Webster Company of Memphis, Tennessee. Each capsule is stated to contain vitamin A, 5,000 units; vitamin D (irra-

1. *A.D.R.*, ed. 14, p. 151

2. *A.D.R.*, ed. 14, p. 150.

3. *A.D.R.*, ed. 14, p. 136.

diated ergosterol), 1,000 units; thiamine hydrochloride, 1.5 mg.; riboflavin, 2 mg.; nicotinamide, 20 mg.; ascorbic acid, 37.5 mg.; pyridoxine hydrochloride, 0.1 mg.; calcium pantothenate, 1 mg., and mixed tocopherols equivalent in biologic activity to 2 mg. of vitamin E. The role of the last three ingredients in human nutrition has not been established.

Each capsule contains the total daily dietary allowance of vitamin A, thiamine hydrochloride and riboflavin recommended for a moderately active man by the Food and Nutrition Board of the National Research Council.[1]

Each capsule contains 33⅓% more nicotinamide and 50% less ascorbic acid than the recommended dietary allowance. Supplemental amounts of vitamin D are necessary only for children, pregnant or lactating women, elderly persons and individuals who have no opportunity for exposure to clear sunshine. The vitamin D content of Nine Vitamins Capsules (1,000 units) exceeds the highest recommended dietary allowance (800 units).

Natural Vitamin B Complex Tablets—Webster: Marketed in tablet form as a dietary supplement by the William A. Webster Company of Memphis, Tennessee. In common with other vitamin mixtures derived from natural sources, the potency of the preparation is low. Each tablet is stated to contain thiamine hydrochloride (vitamin B_1), riboflavin (vitamin B_2), nicotinic acid, each 0.250 mg.; pantothenic acid, 0.125 mg.; pyridoxine (vitamin B_6), 0.04 mg., and other B complex factors natural to brewer's yeast. Only the first three of these vitamins have been established as useful in human nutrition.

A daily dose of 4 tablets is recommended on the label. This would supply 1 mg. each of the three essential dietary factors, thiamine hydrochloride, riboflavin and nicotinic acid. The amounts recommended for a moderately active man by the Food and Nutrition Board of the National Research Council are 1.5, 2.0 and 15 mg. respectively.[1] Thus, each daily dose of Natural Vitamin B Complex Tablets would contain enough thiamine hydrochloride and riboflavin to supplement a deficient diet to a significant extent, but the content of nicotinic acid is inadequate, since it is only one-fifteenth of the recommended daily allowance.

Ascoramide, a vitamin mixture in tablet form, is marketed as an adjunct to dental prophylaxis for gingival diseases, to increase resistance to Vincent's infection and aid in preventing reinfection.

Each tablet is stated to contain 50 mg. each of nicotinamide and ascorbic acid. The firm recommends an adult dose of three tablets per day. The recommended daily dietary allowance for a moderately active man is 15 mg. of nicotinic acid and 75 mg. of ascorbic acid.[1] Thus, the daily dose of Ascoramide provides ten times as much nicotinamide and only twice as much ascorbic acid as is recommended for the diet.

It is important to note the absence from this product of the other members of the vitamin B complex, especially thiamine hydrochloride and riboflavin. Nutritional deficiency in B complex vitamins will not necessarily be adequately corrected by the administration of nicotinamide alone. The current therapeutic practice is to provide nicotinamide or nicotinic acid, thiamine hydrochloride and riboflavin in amounts which bear a definite relation to the total dietary requirements.

ParMeGol is stated to contain paramethylguaiacol compounded with carminative oils and aromatics. It was originally called Gilbert's Oral Treatment. In the labeling it is claimed that the product is germicidal, hemostatic, analgesic, nonescharotic and nontoxic, and that it stimulates the growth of healthy tissue. It is claimed to be useful in the

treatment of pyorrhea, Vincent's angina, blind abscesses, putrescent pulp, dry socket, toothache and denture irritation and as a topical anesthetic and post-extraction dressing.

Methylguaiacol, methyl 2-methoxy phenol, is creosol, a principal constituent of creosote.[4,5] Paramethylguaiacol is one of several isomers which, singly or in mixture, could be called creosol. Creosol and most other phenols have antiseptic properties.

The distributor has been asked to supply a quantitative statement of the composition of ParMeGol, but has not done so. Since the exact composition of the product is not known, its properties cannot be evaluated accurately. Many antiseptics of known composition and properties are listed in *Accepted Dental Remedies.*[6]

"S. T. 37" Antiseptic Solution: Each 1,000 cc. is stated to contain hexylresorcinol, 1 Gm.; glycerin, 300 cc.; sodium bisulfite, 0.095 Gm., and distilled water. Hexylresorcinol is stated to be 1,3-hydroxy, 4-n-hexylbenzene.

Many uses for the product are suggested in the printed matter distributed by the firm. A label statement of especial interest to dentists is, "For use in . . . the hygienic care of mouth and throat. Kills bacteria almost instantly on contact."

The Council's views on mouth washes, which were published recently,[7,8] apply to the use of this product as a mouth wash. Readers interested in a detailed discussion of this class of products are referred to the chapter on mouth washes in *Accepted Dental Remedies.*[8]

Oraclenz Coagulant is a mouth wash concentrate in tablet form. The labeling suggests that it also be used as a cleaner for artificial dentures. The label states that the product contains aluminum sulfate and color.

The directions call for preparation of a mouth wash by dissolving 1 tablet in a half pint of water. A solution prepared in this manner in the A.D.A. Bureau of Chemistry was found to be distinctly acid, having a pH value of 3.0. Two hundred and fifty cubic centimeters of the solution required 51.9 cc. of tenth-normal sodium hydroxide for titration to pH 5.0.

The Council has no information to indicate that this preparation warrants favorable consideration. General information concerning mouth washes appears in *Accepted Dental Remedies.*[8]

Penicillin in Dental Cartridges — R. B. Waite: Each 2.2 cc. cartridge is stated to contain crystalline potassium penicillin G, 10,000 units.

Sterile Isotonic Solution of Sodium Chloride — R. B. Waite: Packaged in 2.2 cc. cartridges.

Using conventional cartridge syringes and aseptic technic, the penicillin may be dissolved in the isotonic solution of sodium chloride or in a local anesthetic solution. Thus, it is possible to prepare penicillin in most of the parenteral and some of the topical dosage forms which have been found useful. This may be accomplished without the necessity of using a glass syringe. It may be more economical, and even more convenient in some instances, to use preparations in vials, even though a glass syringe may be necessary.

Several statements which warrant comment appear in the circulars 9-47 (CO316D), 10-47 (1820) and 10-47 (1861) distributed on behalf of the product.

For example, " . . . the cartridge system of injection offers a particularly useful as well as convenient means of obtaining the desirable high local concentrations of penicillin in areas of infection . . . "

4. *U. S. Dispensatory,* ed. 24. Philadelphia: J. B. Lippincott Company, 1947, p. 337.
5. Sollman, T., *Manual of Pharmacology,* ed. 7. Philadelphia: W. B. Saunders Company, 1948, p. 577.
6. *A.D.R.,* ed. 14, p. 50.
7. What Mouth Wash Shall I Use? *J.A.D.A.* 33:911 (July 1) 1946.
8. *A.D.R.,* ed. 14, p. 131.

"The local infiltration of penicillin solutions has been found to be a valuable adjunct to parenteral administration in the treatment of severe cases of infection with generalized systemic symptoms such as acute osteomyelitis and compound fractures, when the infecting organisms have been found to be penicillin sensitive."

"In addition to intramuscular use in the case of abscesses and osteomyelitis, adjunctive treatment with doses of 10,000 to 30,000 units can be deposited around the infected areas until the inflammation has subsided sufficiently to permit the necessary surgical intervention."

Among the references cited in support of these claims is an abstract in the *1945 Year Book of Dentistry*, page 14. The original article, "The Treatment of Acute and Chronic Infections of the Jaws With Antibiotics," by Leo Stern, appeared in the *New York Journal of Dentistry*, *15*:225 (June-July) 1945. The interested reader may wish to consult this article. In his conclusions, the author states, "Few, but large doses of penicillin injected close to the infection, appear in some cases to be as effective as more frequent intramuscular injections. This method seems decisive in the treatment of pericoronitis, but it is experimental and not without risk."

The firm has submitted an unpublished outline of the results obtained by one of its consultants in a series of 111 cases in which penicillin solutions, with or without other drugs, were injected into infected areas. The results apparently were satisfactory to the consultant, and postoperative complications were reported to be "at a minimum." However, these preliminary data are limited in scope and no control series of cases was used, making any definite conclusions unjustified at the present time.

In its circular, the firm states, "It is important to emphasize the fact that the use of penicillin is merely adjuvant to the usual surgical intervention or other instrumentation." For a summary of the properties and uses of penicillin, see *Accepted Dental Remedies*, edition 14, 1948, page 59.

COUNCIL ACCEPTS PRODUCTS FOR CLINICAL TRIAL

At its nineteenth annual meeting held in March, 1948, the Council on Dental Therapeutics voted that new therapeutic products which meet reasonable standards of safety when used according to directions be accepted for clinical trial, subject to consideration in accordance with the usual procedures, provided the available evidence indicates that they are potentially useful in dentistry. Old products for which new evidence of usefulness appears will be considered as new products. Such products will not be permitted to bear the Seal of Acceptance, and all labels and advertisements must bear a suitable explanatory statement.

Products are listed in this category only if clinical trials adequate to determine the usefulness of the product in den-

tistry are known to be in progress. The Council announces acceptance of Amurol Tooth Powder under these conditions. The active ingredients are dibasic ammonium phosphate and urea. An extensive scientific clinical investigation of this type of product is being conducted by Dr. Robert G. Kesel and his associates[1] of the University of Illinois College of Dentistry in Peoria and Aurora.

The Council plans to accept other products for clinical trial in the future under similar conditions.

Amurol Tooth Powder: Composition: Each 100 Gm. is stated to contain dibasic ammonium phosphate, 5.0 Gm.; urea, 3.0 Gm.; bentonite, 5.0 Gm.; calcium carbonate, precipitated (Snow Top Light and Heavy), 86.6 Gm.; soluble saccharin, 0.2 Gm.; menthol, 0.2 Gm.; peppermint oil, 0.2 Gm.; cinnamon oil, 0.19 Gm.; wintergreen oil, 0.6 Gm.; and sulfocolaurate, 0.5 Gm. Distributed by the Amurol Products Company, Chicago. Licensed by the University of Illinois Foundation.

1. Kesel, R. G., The Biological Production of Ammonia in the Oral Cavity in Relation to Dental Caries Activity. *North-West Den.* 27:127 (July) 1948.

BUREAU OF PUBLIC INFORMATION

PRODUCER OF "THE BRIDE GOES WILD" REPLIES TO CRITICISM OF DENTAL SCENE

IN RECENT weeks, a number of dentists throughout the nation have criticized a scene in the movie, "The Bride Goes Wild," which was produced by Metro-Goldwyn-Mayer Pictures. The scene in question was a gross burlesque of the fear of a child as he entered a dental office for treatment. It was considered to be in bad taste by a majority of dentists who witnessed the production. These criticisms were transmitted by the Bureau of Public Information of the American Dental Association to Metro-Goldwyn-Mayer. The reply of Mr. Louis B. Mayer, M-G-M executive, follows:

Please be assured we are deeply appreciative of your interest in the portrayal of a dentistry scene in our recent production "The Bride Goes Wild," and sincerely regret that it has found criticism among the profession you represent.

It is our desire, at all times, to depict only highest standards of all professions, and constantly strive to do so in our screen presentations. In this particular instance, I am sure you will understand that if any inadvertent license was taken, it was only done so for the purpose of showing a comedy reaction appropriate to the boy's characterization.

At no time was there any thought that this might be construed in any other way, and certainly no possible reflection upon the dental profession was remotely conceived.

It is sincerely hoped that your profession may accept this in the spirit in which it was intended, with our assurance that we shall be conscious at all times of a very sympathetic desire to present the most constructive portrayals in any future pictures.

THE Journal OF THE
AMERICAN DENTAL ASSOCIATION

DECEMBER 1948 • VOLUME 37 • NUMBER 6

LON W. MORREY, D.D.S., *Editor*

Published by the American Dental Association • 222 East Superior St. • Chicago 11, Ill.

EDITORIALS

ARMY'S COMMUNITY RELATIONS PROGRAM NOT DESIGNED TO CORRECT PERSONNEL SHORTAGE

THE Army, faced with a serious shortage of professional personnel in its Medical Department, has launched a nationwide "Community Relations Program" to encourage dentists, physicians and nurses to enlist. The program includes the establishment, in six hundred communities, of a Professional Manpower Committee with representatives of the state and local dental and medical societies as co-chairmen. The Professional Manpower Committee, synchronizing its activities with those of a Military Manpower Committee in each area, will take an inventory of the professional resources of the community, catalog prospective volunteers and encourage them to enlist. This program is obviously designed to convince the Congress that the voluntary recruitment of professional personnel can not satisfy the demands of the armed services, and that new legislation must be secured early in the new session.

The American Dental Association has been deeply concerned over the critical shortage of dentists in the Army. It recognizes that there are many factors which contribute to this shortage and that not all of these are subject to correction or control by the Army itself. In the two-day conference between representatives of the Association and of the Army on August 8 and 9, the Association pointed out that the unjust and inequitable regulations under which dental officers were compelled to serve in World War II constituted one of the major blocks to any large-scale recruiting program at the present time. The Army can abolish this deterrent at any time it wishes to do so. Association officials agreed to lend their aid to facilitate essential recruitment as soon as there were assurances that changes in regulations, supported

by legislation, would be forthcoming. No such assurances have been heard to date.

Instead, the Army has undertaken a public relations campaign for recruitment which can not be productive. It has so far refused to move for the legislative correction of the regulations which, in the last war, produced much inefficient dental service, a profligate waste of manpower and a distinctly lowered morale in the dental corps. Unless the Army shows some disposition to support or promote corrective legislation, this serious situation should be brought to the attention of the Congress early in the new year.

State and local dental societies may recognize some value in the Army's Community Relations Program for enlightening the nation regarding the dental needs of the military. They will not accept it, however, as a conscientious effort of the Army to do something really productive about a situation that is gravely impairing the dental profession's ability to provide dental care for the men and women of the nation's largest fighting force. The Army should give up these attempts to put another patch on an already battered dental corps. Serious diagnosis and treatment are urgently needed.

FIRST NATIONAL CHILDREN'S DENTAL HEALTH DAY, FEBRUARY 7, 1949

THE action of the House of Delegates in directing the Council on Dental Health to conduct an annual National Children's Dental Health Day marks an important step in the Association's efforts of the past forty years to establish dentistry for children as one of its major objects. The first Monday in February has been designated for this purpose and plans are now under way for the observance of the initial program, February 7, 1949.

Forty years have elapsed since Ebersole focused national attention on the dental needs of children and the value of early dental care. The study which he made of a number of children at the Marion school in Cleveland stimulated dental societies throughout the country to initiate similar programs for school children in their communities. The leavening action of these community programs has resulted in the establishment of a nationwide program which will serve to concentrate public attention on the dental defects and diseases of children.

The House could not have selected a more appropriate time to inaugurate this new project. Never before has the profession been so well prepared to provide children with preventive dental service. Research workers have demonstrated the relationship between caries and the consumption of sugars. They have proved that the disease can be prevented, to an appreciable extent, by the topical application of sodium fluoride, and pedodontists have developed new and more satisfactory operative methods.

National Children's Dental Health Day can be used as an effective instrument to bring this newer knowledge to both the profession and the public. It can be used to stimulate a continuous year round dental program for children in every community

and it can activate further research which eventually may result in total control of dental caries.

The Council on Dental Health of the Association is responsible for the national aspects of the project but the success of each community program is the responsibility of the local dental society. Dental societies that have not already done so are urged to start plans now for participation in the initial National Children's Dental Health Day program, February 7.

THE STRENGTH OF THE DENTAL PROFESSION DEPENDS ON A FULL ACTIVE MEMBERSHIP

THE adoption of the revised Constitution and Bylaws by the House of Delegates last September has enabled the Association to streamline its activities and strengthen its administrative procedures. The new Councils have assumed the duties of the old Committees in minimum time and with a minimum of confusion, and have accepted the responsibilities of their assignments to improve public health and advance the science of dentistry.

To serve the public and the profession effectively, the new Councils need the moral and financial support of every ethical dental practitioner. This requires a strong, active membership; one that is interested in the social as well as the scientific aspects of dentistry. The social problems that confront the profession today and the dental health problems that confront the public are so complex that they cannot be solved by individuals working alone. They can be solved only by representatives of a united and enlightened profession cooperating with representatives of other interested agencies.

Now that the Presidential election is over it can be anticipated that the new Eighty-first Congress will give increased attention to various forms of health legislation, including further consideration of a national system of compulsory health insurance. A united dental profession must be prepared to consider these proposals and through properly designated committees take appropriate action for or against their enactment.

In addition, during the coming year the profession will be faced with other important problems affecting public health and dental practice, some of the more pressing of which involve the Army Dental Corps, Veterans Administration, the national emergency program and revision of the Social Security Act. Council members and other representatives of the Asscciation who confer with government officials on these subjects must be fortified with the assurance that they speak for a united profession. Fortunately, they have that assurance, as more than three-fourths, or 68,000 of the 84,000 dentists in this country are active members of the American Dental Association. It is essential that this membership record be continued. Memberships must be renewed on January 1. Their privileges should not be lost even temporarily through carelessness or indifference, since the full strength and unity of the dental profession depend on the membership of organized dentistry.

AMERICAN DENTAL ASSOCIATION RELIEF FUND SAFEGUARDS RELIEF CONTRIBUTIONS

THE Board of Trustees, at the recent session of the Association, completed plans for the establishment of an independent relief fund. Monies previously held by the Association in a separate relief account have been transferred to a new living trust known as the American Dental Association Relief Fund, which is protected legally from attachment. As under past arrangements, the fund can be used only for the relief of worthy dentists and their dependents who are in financial distress. This action by the Board places another safeguard around the contributions which members of the Association and others have made for the welfare of fellow practitioners.

The American Dental Association has the distinction of being the only organization of its kind to maintain a voluntary relief program for its members. The program, which has been in existence since 1907, was established indirectly as a result of the San Francisco fire in 1906. Funds were collected at the time for the relief of colleagues in the stricken city. When needed relief had been provided, the unexpended balance of approximately $3,900 was set up as the nucleus of a national dental relief fund. Since then the fund, augmented largely by the annual sale of Christmas seals, has grown to more than $670,000. This is a sizable sum, but only the interest therefrom can be used to pay benefits. The principal, which remains intact, must be increased materially in order to provide sufficient income from investments safeguarded by the rigid requirements of the new trust agreement.

The new American Dental Association Relief Fund can be made one of the greatest assets of the Association. It can be developed through the sale of Christmas seals to such size that it will provide larger benefits and greater assurance of freedom from want to every worthy, needy dentist.

This month members are again given the privilege of participating in the relief program by purchasing Christmas seals. Every member is urged to exercise that privilege.

INTERNATIONAL CORRESPONDENCE

News From Great Britain

With the cost of dental and medical service under the four-month-old British National Health Service running far ahead of original estimates, it is estimated that at least 8,000 more dentists are needed to keep up with the increased demand for treatment.

First quarter figures on cost of the Service contained in a financial memorandum to the National Health Service Act show that while actual costs for dental, medical, ophthalmic and pharmaceutical services are £152,000,000 ($608,000,000), the government's original estimate called for expenditure of only £200,000,000 for the entire year.

The greatest rush has been for dental, ophthalmic and pharmaceutical services. The demand for spectacles has been phenomenal with a prescription rate of about 150,000,000 annually. This is more than double the total under the old National Health Insurance system which covered only a portion of the population.

Original government estimates for dental treatment under the new scheme were in the neighborhood of £7,000,000 ($28,000,000), while first quarter returns indicate that actual cost of the dental program will be nearer £50,000,000. The demand for dental treatment is at its highest in the history of British dentistry. The extraordinary rush for dentures, extractions and fillings recently has been publicized in the newspapers, by comedians on the radio and in the music hall.

Much is being made in certain quarters of the increased incomes of dentists under the comprehensive health system but their claims appear exaggerated when the increased cost of materials, higher salaries for dental mechanics and increased effort of the dentist himself are considered. General opinion among the lay public, however, is that dentists are making fortunes and that action should be taken to revise fees even before next July when they are scheduled for review.

Latest figures show that by mid-September more than 1,000,000 people had sought dental treatment and that on October 7 8,039 dentists, about 80 per cent of the total, were serving under the national scheme.

In connection with the dental program, the British Dental Association recently issued the following statement to the press: "It is, at best, a repair service for the middle-aged and elderly with a 'priority' service for the young which is woefully incomplete." The importance of children and adolescents in the scheme is emphasized and they should have priority if necessary to the exclusion of the provision of free dental treatment of the old and middle-aged. There is under the present scheme a guaranteed priority for expectant and nursing mothers and for children under five, but the adolescents were omitted from the Minister's priority. The B.D.A. has always stressed the importance of adequate dental treatment for this important section of the community.

The statement goes on to point out the administrative difficulties experienced as the result of the dual control by the Ministry of Health and the Ministry of Education and a third party that has been brought in to pay fifty per cent of the costs; namely, the local council. The salaries of the school dental officers have not been brought into line with the salaries of the dental practitioners in the scheme so that many are leaving the school dental service and practically none are coming forward to fill the vacancies. Thus, there are less dentists than ever to cope with those classes who have been given priority. "Local authorities, having made plans for the enlargement of their priority dental services, are finding that they cannot even maintain those of the pre-Health Act period."

In the past, the school dental service has been understaffed because it has been underpaid. The Ministry of Health has declined the B.D.A's invitation to discuss the question of school dental officers' salaries with a view to bringing them into line with the proposals of salaries as suggested in the Spens' Report. The statement ends as follows " . . . The British Dental Association calls upon the Ministries to take this matter up as one of extreme urgency—it calls upon them to concentrate their energies, ability and resources upon the provision of dental treatment for the young.

THE NATIONAL SCENE

from the Journal's Washington Correspondent

Interest in prospective dental and medical legislation has reached a new pitch as a result of the Democratic upturn in last month's elections. The various groups are girding themselves for fresh assaults on Capitol Hill in behalf of numerous bills, some to be introduced for the first time and others held over from the 80th Congress. There are new committee chairmen to be courted and scores of new faces in Congress to become acquainted with.

Lines are being formed for a campaign to put through the 81st Congress a law under which the federal government would help to establish and finance hundreds of new public health departments in counties and towns throughout the country. Democratic-sponsored child and maternal health legislation that got nowhere in 1947 and 1948 is being dusted off for a fresh effort in 1949. Appropriations committees of House and Senate will hear arguments for funds to continue and extend federal sodium fluoride demonstration programs, effectuate the new National Dental Research Act, maintain the huge outpatient dental program of Veterans Administration and bolster dental aspects of the federal employee health program which is guided by U. S. Public Health Service.

Primary interest is focused, however, on the offensive that is being mounted for a compulsory health insurance act and on the counteroffensive designed to avert enactment of the Murray-Wagner-Dingell bill or anything like it. Coincident with the return to Washington in mid-November of Sen. James E. Murray, proponents of national health insurance began predicting freely that federalized health care will soon become a reality. One source close to the Montanan boldly forecast enactment within five months.

Membership of Committees

Between now and the convening of Congress on January 3, the extremely important job of deciding the composition of House and Senate committees, and their chairmen, will be performed by Congressional leaders, working closely with President Truman. Scheduled to head the Senate Labor and Public Welfare Committee is Sen. Elbert D. Thomas (D., Utah), champion of federal subsidies to dental and medical schools and of federal scholarships in such institutions. Although this is the committee that will conduct hearings and take action on the latest version of Murray-Wagner-Dingell legislation, Sen. Thomas to date has not projected himself into the complexities of this issue. He may be regarded, nonetheless, as a passive supporter of national health insurance. Resumption of what he describes as "phony" arguments against the plan—that is, castigation of the bill and its advocates on the ground that they are Communist-inspired — may well make him an active defender of the bill.

In line to become chairman of the House Interstate and Foreign Commerce Committee, which handles virtually all enabling legislation in the dental, medical and public health fields, is Rep. Robert Crosser (D., Ohio). A specialist in railway labor laws, Rep. Crosser has

never evinced any particular interest in health measures. Re-elected and expected to take the lead, as committee members, in sponsoring and supporting bills of that type are Reps. Alfred L. Bulwinkle (D., N. C.), J. Percy Priest (D., Tenn.), Oren Harris (D., Ark.) and James I. Dolliver (R., Iowa).

Civil Defense Report

A dental section, headed by a chief whose professional qualifications would include membership in the American Dental Association, is provided for in the organization of a proposed Office of Civil Defense. Establishment of a permanent OCD is recommended in a 300 page printed report by the Office of Civil Defense Planning which was made public November 13 by Secretary of Defense Forrestal.

Also recommended is formation of a medical and health advisory committee comprising representatives of the American Dental Association, American Medical Association, American Hospital Association, American Nurses Association and other professional organizations. Regarding dental care, the report states:

> Although assistance from dental personnel will be required by many components of the Medical and Health Services Division (of which the dental section would be a part), dental functions are so specialized and the number of dentists is so large that a separate unit is suggested, including dental hygienists and technicians, as well as qualified dentists.
>
> An important function of dentists during war-time emergencies would be the treatment of maxillo-facial injuries, or surgical procedures for injuries to the mouth and surrounding tissues.
>
> Routine dental care would probably have to be postponed during the period following enemy attack on a city. Some of these conditions, however, are of a more urgent nature and adequate provision should be made for their care.

The full report, entitled "Civil Defense for National Security," is purchasable ($1) from the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C.

Research Council Appointed

While no official word had come from the U. S. Public Health Service Surgeon General's Office it was learned late in November that membership of the National Advisory Dental Research Council had been completed. It appeared safe to assume that the "charter members" who will advise Surgeon General Leonard A. Scheele on administration of the recently enacted dental research act are: Paul C. Kitchin, chairman of the dental studies section on dental research and a professor of dental histology and embryology at Ohio State University; Robert A. Downs, dental director, Colorado Department of Public Health; Maynard K. Hine, dean, Indiana University school of dentistry; Harold Hillenbrand, secretary of the A.D.A.; Harold J. Noyes, dean, University of Oregon dental school; Wendell Harrison, vice-president, University of Chicago; Harold C. Hodge, University of Rochester; Mabel W. Hughes, president, National Congress of Parents and Teachers; Henry F. Vaughan, dean, University of Michigan school of public health; Harriet Bartlett, Simmons College; Theophilus S. Painter, president, University of Texas and Arnold Nicholson, managing editor, Country Gentleman. (A brief biography of each member will be included in a forthcoming issue of THE JOURNAL.)

A. D. A. AFFAIRS

ANNUAL A.D.A. RELIEF FUND DRIVE UNDER WAY:

$100,000 Goal Set for Contributions

The annual American Dental Association Relief Fund drive is underway and a goal of $100,000 for the 1948-49 contributions has been set by the Council on Relief, according to Secretary L. H. Jacob, of Peoria, Ill.

To stimulate interest in the Fund, unique in that it is the only relief fund dedicated solely to dentists and their dependents and wholly supported by a single profession, the Council, headed by John S. Owens, of Camden, N. J., has established contribution quotas for all constituent societies and the federal government dental corps. As in the past, half of the funds collected will be returned to societies from which they came, provided the state society has established a fund of its own in accordance with the rules of the Council on Relief.

This year's $100,000 goal is slightly more than double the $47,072.57 received last year, and the Council has urged all constituent societies to enlist the aid of component societies in meeting their quotas. It also has been pointed out that the state quotas do not represent an effort to suggest what any individual should contribute.

In some cases the society quotas actually are less than what they contributed last year but, in general, they are higher.

A list of the quotas compared with last year's contributions follows:

STATE	1948-49 QUOTA	1947-48 CONTRIBUTIONS
Ala.	$ 800.00	$ 1,450.85
Ariz.	200.00	93.50
Ark.	400.00	98.00
Army	400.00	115.00
Calif.	3,550.00	2,034.77
So. Calif.	4,190.00	4,059.34
Colo.	900.00	533.00
Conn.	1,950.00	1,215.48
Dela.	100.00	56.00
D. C.	900.00	420.50
Fla.	1,100.00	644.50
Ga.	1,000.00	331.50
Hawaii	300.00	207.50
Idaho	200.00	92.50
Ill.	7,710.00	3,145.75
Ind.	2,450.00	857.50
Iowa	1,950.00	782.50
Kans.	1,160.00	478.10
Ky.	1,120.00	1,168.00
La.	1,030.00	298.50
Me.	500.00	177.50
Md.	1,020.00	241.50
Mass.	3,800.00	1,338.69
Mich.	3,900.00	1,108.00
Minn.	3,140.00	1,220.60
Miss.	500.00	186.85
Mo.	2,690.00	2,634.19
Mont.	400.00	230.50
Navy	500.00	91.00
Nebr.	1,180.00	1,046.00
Nev.	100.00	24.50
N. H.	300.00	97.00
N. J.	4,170.00	1,332.65
N. M.	200.00	44.00
N. Y.	15,830.00	7,797.83
N. C.	1,150.00	1,162.35
N. Dak.	300.00	99.50
Ohio	4,860.00	1,240.00
Okla.	900.00	439.00
Ore.	1,115.00	278.50
Panama C. Z.	30.00	24.00
Pa.	7,520.00	3,374.61
U.S.P.H.S.	200.00	36.00
P. R.	300.00	24.00
R. I.	600.00	171.50
S. Car.	500.00	255.25
S. Dak.	400.04	63.00
Tenn.	1,120.00	424.35
Texas	2,900.00	854.00
Utah	500.00	389.41
Vt.	200.00	54.00
V. A.	900.00	96.00
Va.	1,100.00	311.00
Wash.	1,640.00	1,063.50
W. Va.	800.00	314.00
Wis.	3,070.00	685.50
Wyo.	200.00	59.50
Totals	$100,000.00	$47,072.57

A new policy approved by the House of Delegates which allows A.D.A. Relief Fund grants to be double the combined grant of the constituent and component societies is now in effect. Previously grants were made on a 50-50 basis. In addition, the Relief Fund has been established as a perpetual charitable trust, known as the American Dental Association Relief Fund.

All Relief Seals, the Relief Fund's annual reminder to Association members, were mailed from the Central Office by mid-November.

Contributors are urged to enclose their contribution in the special envelope which accompanied the seals or to address their contributions to the American Dental Association Relief Fund, 222 E. Superior St., Chicago 11.

HOOVER COMMISSION GETS DENTISTRY'S VIEW:

A.D.A. Spokesmen Urge Administrative Revisions

Dentistry's need for "parity of administration" with medicine in the federal government and the desirability of establishing a federal Department of Health were told to the Committee on Federal Medical Services of the Commission on Organization of the Executive Branch of the Government by Clyde E. Minges, president and Harold Hillenbrand, secretary of the A.D.A., at a meeting in Washington late in October.

A statement of the Association's views of dentistry's position in the federal government and its agencies was requested by the Committee, headed by Tracy S. Voorhees, which has been gathering information for the parent Commission led by former President Herbert Hoover.

Drs. Minges and Hillenbrand outlined dentistry's status as a health service with a separate system of licensure, a separate system of education and a separate system of professional organization which are more than a century old.

They cited the fact that the A.D.A. represents a large percentage of the practicing dentists in the United States (some 70,000 out of a total of about 84,000) and pointed out that "extreme care must be taken" to avoid wastage of dental personnel since the annual death and retirement rate of dentists is approximately 2,000 while only about 2,500 to 3,000 are being graduated each year.

Dentistry no longer is considered as a "casual part of medical practice," they said, adding, "in the past three decades the profession has demonstrated beyond question the essentiality of dental service in any comprehensive health service." As an example of the neglect of dentistry as an essential health service, they pointed out that the Committee does not have an official representative of the dental profession as a member.

The A.D.A. spokesmen made clear that the Association did not presently favor so-called "administrative autonomy" for dentistry in the federal government and that it supported administrative practices based on "parity" with the medical profession.

"The first view (administrative autonomy) is an extreme one," they said, "brought about largely because of a long history of discriminatory administrative practices against dental programs and personnel. To carry out such a complete separation of the dental programs in federal agencies would undoubtedly lead to an unwarranted duplication of services, facilities and functions. Such a program, in the long run, could lead only to chaotic administration and to segmentation of

total health into isolated portions, each under highly individualistic control."

In presenting the Association's view that "administrative parity" is essential for the conduct of sound dental programs, the statement said: "Such an arrangement permits persons qualified in dentistry to manage dental programs. It places administrative responsibility for dental programs on those who are not preoccupied with problems that bear only a nominal relation to dentistry. It aids the establishment of a clear-cut definition of functions, services and activities. It eliminates a chaotic administrative pattern which must reveal itself in diminished efficiency and a lower quality of service."

It was further pointed out that dental programs should be integrated with medical and other health programs under administration which permits cooperation without domination.

Legislation for Parity

The Association representatives stated that legislation sponsored by the A.D.A. providing such "parity" for the Navy's Dental Corps has been instrumental in improving the efficiency of that organization. The Navy Dental Corps now controls its own personnel which is "no longer subject to the whims of non-dental officers."

The administrative pattern of the Army Medical Department and Dental Corps, however, was defined as "defective" and listed as a serious impairment to the Army's efforts to secure enough dentists for military service.

"During the recent war," the A.D.A. statement continued, "no support could be secured for the correction of these inadequacies through legislation and there were only half-hearted attempts to correct them by changes in regulations. This inability to correct an administrative program, which, by their own admission, was seriously impairing the rendering of an efficient dental service, has resulted in considerable antagonism and ill-will toward seeking service or a career with the Army Dental Corps. This inadequate administrative program of the Army Medical Department undoubtedly has had material effect on the quality and cost of the service rendered by the Dental Corps. This problem should have the studied attention of this Committee to prevent continuation of conditions which can impair seriously the health program in a national emergency.

"The basic problem in this situation is the familiar concept that a dental program must be administered by a medical officer even though he is not qualified by interest, education, licensure or experience to do so. Additionally, there is apparently a studied effort on the part of the Department of the Army to impose regulations on dental personnel and programs which are not consonant with efficiency, economy and good morale."

A New Agency

Creation of a federal Department of Health whose chief executive would be a member of the Cabinet of the President of the United States was recommended with the comment that the Association has espoused this view since 1939 when its House of Delegates approved the following statement: "the Congress of the United States (should establish) a federal department of health with a secretary who shall be a graduate in medicine and a member of the President's cabinet; and a first assistant secretary who shall be a graduate in dentistry. It (should) be the duty of this department to coordinate under its jurisdiction all health activities of the federal government, with the exception of the military services."

It was stated that the Association does not believe that a federal Department of Health, if established, should include under its jurisdiction the social and welfare programs not directly related to health problems.

"If a federal Department of Health is

created," they said, "the functions, services and activities of the Federal Security Agency should be evaluated on the basis of the new administrative pattern."

Comments of the A.D.A. spokesmen concerning several other federal agencies follow:

1. The U. S. Public Health Service has a "seemingly satisfactory" dental program and its "administrative pattern appears to be adequate."

2. The new National Dental Research Institute's development should parallel to a large degree the developments of other national institutes of health.

3. U. S. Public Health Service should give more attention to establishing adequate dental facilities in its expanding hospital service.

4. The Children's Bureau, now a part of the Social Security Administration, should be transferred to the U. S. Public Health Service to eliminate duplication and coordinate related health activities.

Lack of Equality

In connection with the Veterans' Administration the A.D.A. representatives said that there is a lack of equality between the grades granted medical and dental personnel and that the entire dental program would become more efficient if placed on the same administrative level as the medical program. A review of the ever-enlarging scope of so-called "service connected disabilities" program was advocated.

The federal government's national emergency program would best be served by coordinating the agencies involved, they said, adding that the Association views with "growing concern" the multiplication of agencies concerned with problems of health during a national emergency.

"The Association believes that the appointment of an over-all dental advisory committee to the Secretary of Defense would be an important contribution to much-needed correlation," Drs. Minges and Hillenbrand stated near the end of their report. "In addition, all federal agencies concerned with health problems during a national emergency should eventually clear through a single agency, such as the National Security Resources Board, so that there will be economy of operation, elimination of waste in the use of professional personnel, the prevention of competition in procuring dental manpower and a consideration of the health of both the military and the civilian patient."

The Committee report will be presented to the Commission by January 1 and the Commission plans to submit its report to Congress late that month.

A.D.A. Membership Drive

A drive to enroll eligible dentists among the approximately 15,000 in the United States not yet members of the A.D.A. has been instituted by the Council on Membership, according to Chairman H. C. Jarvis of Cincinnati.

More than three fourths of all the practicing dentists in the nation now are members of the Association and all memberships must be renewed by Jan. 1, the Council reports. Dues are $12 per year.

Recent figures released by the membership department of the A.D.A. show that total membership on September 30 was almost 70,000. Only slightly more than 5,000 of that total are student and life members. In August of this year it was reported that there was a total of 83,181 dentists in the country and it was estimated that about 75,000 of them were in active practice.

REPORT SHOWS 83,000 DENTISTS IN U. S.:

Population per Dentist Reaches 1,717

At the end of June there were 83,181 dentists in the United States as compared to a total civilian population of about 142,659,000, a report by the A.D.A.'s Council on Economic Research and Statistics states.

The report shows that there were 1,717 persons for every dentist in the country and supplemental information from the Council reveals that there are only about 75,000 dentists in practice.

Distribution of dentists by region and state as shown in the report follows:

DISTRIBUTION OF DENTISTS IN U. S.

Compiled by the Council on Economic Research and Statistics of the the American Dental Association

Region and State	Number of Dentists	Population per Dentist
New England	*6,352*	*1,435*
Connecticut	1,449	1,360
Maine	425	2,080
Massachusetts	3,565	1,297
New Hampshire	261	2,034
Rhode Island	486	1,523
Vermont	166	2,199
Middle East	*25,626*	*1,340*
Delaware	134	2,164
D. C.	720	1,154
Maryland	844	2,501
New Jersey	3,153	1,453
New York	13,517	1,046
Pennsylvania	6,603	1,590
West Virginia	665	2,873
Southeast	*8,787*	*3,317*
Alabama	711	3,976
Arkansas	429	4,457
Florida	1,077	2,117
Georgia	865	3,600
Kentucky	946	2,919
Louisiana	1,022	2,480
Mississippi	476	4,384
North Carolina	944	3,877
South Carolina	428	4,507
Tennessee	992	3,111
Virginia	897	3,294
Southwest	*3,401*	*3,081*
Arizona	210	3,033
New Mexico	158	3,405
Oklahoma	845	2,692
Texas	2,188	3,213
Central States	*24,905*	*1,548*
Illinois	6,239	1,341
Indiana	1,991	1,925
Iowa	1,731	1,496
Michigan	3,360	1,803
Minnesota	2,332	1,239
Missouri	2,613	1,493
Ohio	4,106	1,867
Wisconsin	2,533	1,281
Northwest	*4,356*	*1,687*
Colorado	764	1,475
Idaho	248	2,117
Kansas	1,015	1,885
Montana	307	1,586
Nebraska	939	1,365
North Dakota	331	1,634
South Dakota	239	2,406
Utah	373	1,710
Wyoming	140	1,857
Far West	*9,754*	*1,404*
California	7,041	1,376
Nevada	87	1,598
Oregon	1,105	1,397
Washington	1,521	1,525
TOTAL by States	83,181	1,715
U. S. Army	894	....
U. S. Navy	846	....
U. S. Public Health	226	....
U. S. Veterans Admin.	635	....
TOTAL Federal Government Dental Corps	2,601	....
Alaska	30	....
Hawaii	244	....
Panama Canal Zone	18	....
Puerto Rico	249	....
TOTAL Miscellaneous Listings	541	....

Student Membership Campaign

The University of Texas school of dentistry is the first to report 100 per cent enrollment in the A.D.A.'s campaign for student members. All 193 students in the undergraduate school have joined and now are eligible to attend all scientific meetings of the Association in addition to receiving every issue of THE JOURNAL. Formerly only upperclassmen were eligible for membership.

Adoption of a revised Constitution and Bylaws enables the Association to open student membership to all undergraduate and postgraduate students and interns at an annual fee of $3.

Other schools reporting success in their individual drives to enlist student members are: University of Southern California, University of Kansas City and Northwestern University.

There were approximately 3,300 student members in the Association in 1948 and that total is expected to be more than doubled in 1949.

Back Issues of Journal Needed

The subscription department of the American Dental Association urgently needs 12 copies of certain back issues of THE JOURNAL and will pay $1 per copy up to the number of copies needed.

Copies of all issues in the following years are required: 1914-15-20-23-24-25. Copies needed for the entire year except for the months listed are: 1916, except July; 1917, except November; 1918, except March, August and November; 1919, except January; 1921, except September, and 1922, except May.

Copies of the following issues also are wanted: January, February, April, May, July, August and November of 1926; January, July, August and December of 1927; April and September of 1928; January and May of 1929; February, March and September of 1930; January, June, September and October of 1931; January of 1932; October of 1933; February, April, May and June of 1934 and April of 1942.

Copies of the old mid-monthly edition of THE JOURNAL are wanted for September and December of 1942.

A.D.A. Appoints Legislative Secretary

Appointment of Francis J. Garvey, of Washington, D. C., as secretary of the A.D.A.'s Council on Legislation has been announced by Harold H. Hillenbrand, secretary of the Association.

F. J. Garvey

Mr. Garvey joined the Central Office staff in Chicago on Dec. 1 following his resignation as chief of the legislative projects division of the Veterans Administration. He fills a position made vacant when George H. Fox resigned last January to accept a position with the National Confectioners Association.

A.D.A. Council Members Change

Rudolph H. Friedrich, of Plainfield, N. J., has been appointed chairman of the A.D.A.'s Council on Federal Government Dental Corps and Tracy K. Healy, of Brooklyn, N. Y., has been appointed a member.

Dr. Friedrich, a native of Chicago and graduate of Northwestern University dental school, served in the Army during World War II and was discharged as a lieutenant colonel.

Dr. Healy, a veteran of World War I, is a graduate of Columbia University dental school and replaces Karl H. Metz, of Valhalla, N. Y., who resigned upon his recall to active duty with the Army.

The resignation from the Council of John S. Voyles, of St. Louis, also has been received but his successor has not

yet been named. Dr. Voyles is a consultant to the Veterans Administration and has stated that his position as a consultant might result in a "conflict of interests even though I am not an employe of the V. A."

Committee on Emergency Organizes

The A.D.A.'s special committee on national emergency dental service met and organized recently in Washington, D. C. Committee members who attended the first meeting are: Harry Lyons, Richmond, Va., chairman; Harold Hillenbrand, Chicago, ex-officio member; LeRoy M. Ennis, Philadelphia; Percy T. Phillips, New York; Gerald D. Timmons, Philadelphia and C. J. Wright, Lansing, Mich. Other A.D.A. personnel who attended are: President Clyde E. Minges, Rocky Mount, N. C.; William McGill Burns, New York, A.D.A. trustee; R. H. Friedrick, Plainfield, N. J., chairman of the Council on Federal Government Dental Corps and Francis J. Garvey, Washington, D. C., new secretary of the Council on Legislation.

A.D.A. HOLDS FIRST MANAGEMENT CONFERENCE:

Twenty-One States Are Represented

The first state secretaries' management conference, sponsored by the A.D.A., ended with the unanimous agreement that such meetings should be a continuing part of the Association's state relations program. Conferees also suggested that additional meetings on special problems be conducted in the future.

Held at the Central Office from Nov. 15 to 19 the conference was attended by 23 state society secretaries and executive secretaries. It was designed to provide an exchange of problems and ideas on dental society management.

The program was opened by Harold Hillenbrand, A.D.A. secretary, on the note that the Association's management problems were those of its constituent societies. Shailer Peterson, secretary of the Council on Dental Education, explained that the conference would be a "workshop."

Monday afternoon — Dr. Hillenbrand, in the opening address, discussed basic law for a dental society, the desirability of legal incorporation of a society, the need for careful analysis by societies of their present constitution and bylaws, the structure and function of dental society committees and other fundamental aspects of administration. Other speakers were Donald A. Wallace, secretary of the Council on Dental Therapeutics, who discussed "Handling Committee Procedures by Mail" and Allen O. Gruebbel, secretary of the Council on Dental Health, who spoke on "Organizing a Committee's Program."

Tuesday morning—Practical Administration was the discussion topic and Phillip E. Adams, president-elect of the A.D.A. and secretary of the Massachusetts State Dental Society, spoke on the advantages of a house of delegates as the legislative body for a state dental society. Paul W. Clopper, secretary of the Illinois State Dental Society, discussed the advantages of having an executive council rather than a house of delegates. Other speakers were Dr. Hillenbrand, who discussed "Dental Society Finances," and John J. Hollister, business manager of the Association, who presented "Technics in Dental Society Finances."

Tuesday afternoon—This entire program was devoted to the subject of membership. Louis M. Cruttenden, assistant secretary of the Association, in discussing maintenance of membership, stated that a society depends on members not only for financial support but for ideas and advice in the formulation of policies. Shailer Peterson discussed the problem of life membership. Mr. Hollister stressed the importance of maintaining good biographical records of dentists.

Wednesday morning—Herbert B. Bain, director of the A.D.A. Bureau of Public Information, spoke on the objectives and scope of a public relations program for dental societies. In the open discussion that followed it became apparent that dental public relations is a controversial subject and that sharp differences of opinions exist among dental leaders.

Wednesday afternoon—Preceding the afternoon session, James Robinson, executive secretary of the Southern California State Dental Association, presented several dental health recordings recently made by that association.

The regular session was devoted to "Publications in Dentistry." Mr. Hollister discussed the problems encountered in the business management of a publication. Dr. Wallace discussed the evaluation of advertising claims.

Lon W. Morrey, editor of THE JOURNAL, discussed editorial problems of a publication and cited the need for close and harmonious relationship between the editor and secretary of the dental society.

Thursday morning—This program was devoted to Professional Relations with Allen O. Gruebbel, secretary of the Council on Dental Health, as speaker. He stressed dental society leadership in public health.

Thursday afternoon—The business side of an annual session was discussed by Mr. Hollister, who pointed out that thorough program planning and management are essential.

A portion of this program was devoted to the sale and management of commercial exhibits, ending with a discussion by the state secretaries.

Friday morning — The program was opened by Arthur J. Snider, science editor of the Chicago Daily News, a guest speaker. He covered the problem of the dentist's relation with news reporters and stated that great progress has been made recently in establishing better cooperation between the profession and the press.

Following a general discussion of the handling of releases for lay public consumption, the conference was evaluated briefly by Dr. Hillenbrand and was adjourned.

State society secretaries, executive secretaries and their representatives who attended the conference were: John G. Rooks, California State Dental Association; James Robinson, Southern California State Dental Association; Earle S. Arnold, Connecticut State Dental Association; Paul W. Clopper, Illinois State Dental Society; E. E. Ewbank and Miss Mary Ellen Ewbank, Indiana State Dental Association; Harry I. Wilson, Iowa State Dental Society; Miss Ann Hafendorfer, Kentucky State Dental Association; Julian S. Bernhard, Louisiana State Dental Society; E. I. Pessagno, Jr., Maryland State Dental Association; Philip E. Adams, and L. T. Maloney, Massachusetts Dental Society; Fred Wertheimer and H. C. Gerber, Jr., Michigan State Dental Society; Carl V. E. Cassel, Minnesota State Dental Association; F. A. Pierson, Nebraska State Dental Association; A. L. Smeby, North Dakota State Dental Association; H. Leon Snow, Oklahoma State Dental Association; Willard H. Hurley, Oregon State Dental Association; Ray Cobaugh, Pennsylvania State Dental Society; T. T. McLean, Tennessee State Dental Association and Kenneth F. Crane, Wisconsin State Dental Society.

DENTAL SOCIETIES

New Orleans Dental Conference

More than 650 southern dentists attended the first annual New Orleans Dental Conference of the New Orleans Dental Association late in October and it was predicted by conferees that the program will become an outstanding regional event attracting a number of Latin American dentists.

Speakers on the program included: E. Carl Miller, East Cleveland, Ohio; James H. Pearce, Chicago; G. R. Lundquist, Chicago; J. Roy Bourgoyne, Memphis; Sumter S. Arnim, Houston, Texas and Emil H. Bollwerk, St. Louis. Some 20 other dentists gave general clinics.

Dental Health Day Programs Progressing

The Cleveland Dental Society is the first to announce its program for National Children's Dental Health Day since the A.D.A.'s Council on Dental Health disclosed plans to observe Feb. 7 as a day devoted to making the public and the profession additionally conscious of dental health for children.

Activities ranging from poster and essay contests on children's dental health to table clinics for dentists are included in the society's program. A special afternoon program for the public also is scheduled and will feature a talk by John W. Knutson, of the U. S. Public Health Service, movies and animated cartoons for children, presentation of contest awards and a musical interlude by the Cleveland Dental Society Orchestra.

In a letter to THE JOURNAL, W. H. Derrer, chairman of the society's committee on attendance and registration, stated that local newspapers and radio stations also were participating in the effort to conduct a successful children's dental health day observance. The newspapers are holding the poster and essay contests and the radio stations are planning special programs.

Plans for obtaining a proclamation by President Truman setting aside Feb. 7 as Children's Dental Health Day are underway, according to Allen O. Gruebbel, secretary of the A.D.A. Council on Dental Health. He also states that many constituent and component societies also are planning programs for both the public and dentists.

Recommend Seven Aids to Health Program

Seven recommendations designed to aid in providing a dental health program were formulated at the recent joint dental conference of the New York State Dental Society and the State Department of Health. They are:

1. To provide preventive and treatment services to every child as rapidly as resources will permit.

2. Improve dentist distribution in urban and rural areas and to increase the number of practicing dentists.

3. Train and utilize auxiliary personnel such as dental assistants and hygienists.

4. Extend treatment for malocclusion to a greater number of children, especially those eligible for public assistance.

5. Report at birth all cases of harelip and cleft palate.

6. Expansion of dental service to industrial employes.

7. Provide more effective dental health education services.

Allen O. Gruebbel, secretary of the A.D.A.'s Council on Dental Health, spoke during the three-day meeting.

Three-Phase Dental Seminar A dental seminar covering fluorine therapy, prosthetics and roentgenography was held by the Arkansas State Dental Association, Nov. 21-23, at Little Rock. Thermon B. Smith, of Little Rock, was chairman.

Speakers on the three-day program included: President J. O. Hall; Howard Raper, Albuquerque, N. M.; S. T. Williams, St. Louis and Thomas L. Hagan, New Orleans.

Members of the seminar committee, in addition to Dr. Smith, were Norman Grammer, Hugh Moseley, Walter Wyrick and H. M. Flickinger.

County Dental Division Established Establishment of a dental division in the Peoria County (Ill.) Health Department and the purchase of a trailer to be used in bringing treatment to more than 8,000 pupils at 110 widely scattered schools has been announced by the Peoria District Dental Society.

The trailer was purchased with county funds, according to Clifton B. Clarno of the Society's committee and member of the County Board of Health.

General objectives of the program, according to Dr. Clarno, are to teach the value of dental care as a health service, create a desire for dental service, apply preventive measures to as many children as the program will permit and render dental service to a group that could not otherwise receive dental care.

T. F. McBride Appointed Editor Appointment of T. F. McBride, of Pittsburgh, as editor of the Pennsylvania State Dental Journal has been announced by J. T. O'Leary, chairman of the Journal Committee of the Pennsylvania State Dental Society. Dr. McBride succeeds Abram Cohen, of Philadelphia, who resigned. He has been active in dental journalism for twenty years.

First Dental Missionary At a recent meeting of the Fifth District Dental Society of North Carolina a resolution honoring Sandy C. Marks, of Wilmington, N. C., was passed. Dr. Marks is leaving the state to become a dental missionary in the Belgian Congo, Africa. The resolution stated that he may be the first dentist ever to become a dental missionary.

PUBLIC HEALTH

Membership Requirements Requirements for active membership in the American Association of Public Health Dentists have been changed, according to Carl L. Sebelius, secretary of the organization.

"A person is now eligible for membership in the A.A.P.H.D. if he is a member of the American Dental Association and is a director or assistant director of a state dental public health program or is administering or promoting a dental health program on a national, state or local level," Dr. Sebelius said.

Examinations for Dental Surgeons Listed An examination for appointment to the Regular Corps of the U.S. Public Health Service as assistant or senior dental surgeon this year will be held Dec. 15, according to James S. Miller, deputy chief of the division of dentistry.

Applicants must be citizens, at least 21 years of age and must have completed the prescribed course in a reputable school. He must have been granted a degree or certificate in the profession in which the examination is held. At least

seven years of educational training exclusive of high school are required in addition to professional training and experience.

The examinations will be given at the U.S. Marine Hospitals in Boston, Stapleton, N. Y., Norfolk, Va., New Orleans, San Francisco, Seattle, Chicago, Cleveland and Kirkwood, Mo.; also at U.S. Public Health Service relief stations in Los Angeles, Philadelphia and at the Public Health Service dispensary, Washington, D. C. Further information may be secured by writing the Division of Dentistry, U.S. Public Health Service, Washington 25, D. C.

Other examinations will be given in January, March and April.

Public Health Dental Internships

While announcing that applications for U.S. Public Health Service internships must be received by Feb. 15, it also was stated that there are 32 dentists now interning at Marine Hospitals. All interns in dentistry are commissioned as assistant dental surgeons in the Reserve and are on active duty for at least a year. They participate in all hospital services for designated periods.

Evaluation Committee Recommended

Appointment of a committee to evaluate the effects of U.S. Public Health Service programs of research and educational grants on medical education has been recommended to Surgeon General Leonard E. Scheele by the National Advisory Health Council.

The Council was established by law to advise the Surgeon General and make recommendations on matters related to health activities and functions of the Public Health Service. It has 14 members.

The proposed study will make available information essential to resolving the problems confronting medical education and will form a part of the current Federal Security Agency studies of the entire field of higher education, Federal Security Administrator Oscar R. Ewing commented in the F.S.A. release.

The committee will include representatives of advisory councils to the Public Health Service, medical education institutions, professions groups and the public.

Children's Program

A program to aid indigent children has been established by the Nevada State Department of Health, and dentists in nine localities are devoting three hours a week to treatment of these patients in their offices, O. M. Seifert, dental division director reports. He adds that a U. S. Public Health Service topical fluoride demonstration team is expected in the state within the "next few months."

International Health Office Appoints

The appointments of L. L. Williams, Jr. as chief of the Office of International Health Relations, U.S. Public Health Service and H. van Zile Hyde as deputy chief, have been made public by Federal Security Administrator Oscar R. Ewing.

Dr. Williams who has been medical director of O.I.H.R. succeeds James A. Doull who has been detailed to the American Leprosy Foundation as director of research. Dr. Hyde fills Dr. Williams' position as medical director in addition to becoming deputy chief. Both men now are on detail to the Department of State and assume their new posts in addition to carrying on their present work.

National Health Directors Meet

Assistant Surgeon General Bruce D. Forsyth, chief of the U.S. Public Health Service division of dentistry, recently attended the Sixth Conference of National Directors of Health, sponsored by the Pan-American Sanitary Bureau, at Mexico City.

DENTAL EDUCATION

U. of Illinois Appoints

Dean Allen G. Brodie, of the University of Illinois college of dentistry, has announced the appointment of John M. Spence as professor of operative dentistry and head of that department. Dr. Spence has been on the faculty since 1937 and was chief of dental service for the 13th General Hospital in the Pacific Theatre during the war.

It also was announced that Stanley D. Tylman, professor of crown and bridge and head of the department, is lecturing in South America at the Universities of Buenos Aires and Cordoba. He is expected to return in January.

Graduate and Postgraduate Courses

Graduate and postgraduate courses announced recently by several dental schools follow:

U. of Illinois.—A two-year, full-time graduate course in the basic sciences, with limited clinical experience is being offered by the graduate school through the department of oral and maxillofacial surgery and applications are being accepted now for Sept. 1949. The course will carry credit toward a Master of Science degree. For additional information write Department of Oral and Maxillofacial Surgery, College of Dentistry, University of Illinois, 808 S. Wood St., Chicago 12.

Ohio State U.—A Winter and Spring Quarter series of postgraduate courses for dentists and dental hygienists is being offered by the postgraduate division of the college of dentistry. The Winter series begins Jan. 10. Each group is limited to ten students, according to Hamilton B. G. Robinson, division director.

Courses offered in both quarters are: x-ray, anatomy, periodontia, full dentures, partial dentures, oral surgery and oral pathology.

Courses in the Winter quarter only are: dental caries control and oral hygiene for dental hygienists. Courses offered for the Spring quarter only are: crown and bridge, children's dentistry and operative dentistry. Further information may be secured from the Postgraduate Division of the College of Dentistry, Ohio State University, Columbus.

U. of Pennsylvania.—All applicants for admission to the University of Pennsylvania's school of dentistry will be required to take the medical college admission test, according to J. L. T. Appleton, dean. The school of dentistry also is participating in the A.D.A. Council on Dental Education aptitude testing program which still is in the experimental stage. For further information write The Thomas W. Evans Museum and Dental Institute School of Dentistry, University of Pennsylvania, Philadelphia, 4.

Columbia U. Appoints Dr. Hickey

Columbia University has announced the appointment of Maurice J. Hickey, professor of oral surgery on the faculty of medicine, as acting associate dean of dentistry to succeed Bion R. East, who has been granted a leave of absence to serve as chief of dental service for the Veterans Administration.

Dr. Hickey, of Syracuse, N. Y., is a graduate of the Harvard University school of dentistry and holds an M.D. from the College of Physicians and Surgeons of Columbia University. He was appointed a fellow at the National Cancer Institute in 1937, spent two years as a resident in training at Columbia's medical center specializing in head and neck surgery and until 1942 was a plastic surgeon at the center. His Army service covered three years during which time he was chief of dental service for the Second General Hospital.

ARMY AND NAVY

PROFESSIONAL STUDENT DRAFT DEFERMENTS ASKED:

Army and Navy Seek Recruits to Meet Shortage

A program for deferment of students of dentistry, medicine, veterinary and osteopathy has been approved by Selective Service and the nation's 3,657 draft boards have been asked to grant deferments on recommendation of the deans of the graduate schools. Final authority on deferment still rests with the local board.

As reported in the November issue of THE JOURNAL, pre-dental students also will be recommended for deferment by the dental school deans on the basis of 55 per cent of the 1949 freshman class, 62.5 per cent of the 1950 freshman class and 100 per cent of the 1951 freshman class. The rise in deferments over the three years is attributable to the expected decrease in the number of veterans and other non-draftable students.

At present about 44,000 dental, medical and other professional students are deferable, according to Selective Service.

Meanwhile the Army still is faced with what it calls "a critical" shortage of dentists and reports the Dental Corps will be short of its June, 1949 officer quota by 2,100.

Regulations have been modified in an effort to make the service more attractive to prospective recruits with changes designed to provide administrative parity for the Dental Corps with the Medical Corps, a problem which became acute during World War II.

Other indications that the Army is feeling the shortage are:

1. An order stating that recruits and inductees alike must have 16 natural teeth, four upper and lower anterior and posterior, where previously they could be edentulous.

2. A report from Washington, D. C. that the Army Surgeon General's Office is preparing to ask Congress for authority to commission women dentists, physicians and other professional personnel. At present women officers in the Army are restricted to the Women's Auxiliary Corps and the Nurses Corps while the Navy already has commissioned women regulars in the medical department. The Navy tentatively has set a quota for commissioning two women dental officers this year with additional quotas for 1949 and 1950.

3. An order by both the Army and Air Force eliminating all but emergency dental care for dependents of service personnel, a direct reversal of the Medical Department's established policy.

Reports from Washington also indicate that new draft legislation designed to provide additional professional personnel may be introduced early in the next session of Congress. A proposal to draft dentists, physicians and others up to 45 years of age was killed before the present draft act was passed by the 80th Congress despite approval of the measure by the military affairs subcommittees of the House and Senate.

The Navy Dental Corps also reports it was short 471 dental officers on Nov. 1, according to a report from the Bureau of Medicine and Surgery.

Computed on the basis of the existing quota of two dental officers for 1,000 persons on active duty there should be 1,081 dental officers on duty. Active duty strength on Nov. 1 was 802 dental officers, the report said, adding that 610 of those are Regulars and 192 are Reserves who have volunteered for active duty periods of one year or longer.

Establish Navy Dental Clinic The recently established Navy Dental Clinic at Guantanamo Bay, Cuba, was commissioned by Rear Adm. W. K. Phillips in a ceremony held in October. Cmmdr. Joseph H. Scanlon, of the Navy Dental Corps, is in command.

This is the fifth naval dental clinic established as a separate command by the Secretary of the Navy. The other four are located at New York, Washington, D. C., Pearl Harbor and Guam.

60 Dentists Complete Navy Studies A class of sixty dentists was graduated recently from the Navy's postgraduate courses given at the Naval Dental School, Bethesda, Md. Ten regular Navy dentists completed the general course, four completed the specialized course in prosthodontia, two completed the specialized course in oral surgery and 44 were graduated from a training course for reserve dental officers.

The graduation ceremony was under the supervision of Capt. Louis D. Mitchell, commanding officer of the Dental School and major addresses were given by Rear Adm. Clemens V. Rault, assistant chief of bureau for dentistry and chief of dental division of the Bureau of Medicine and Surgery; Clyde E. Minges, president of the American Dental Association and Rear Adm. Clifford M. Swanson, Navy surgeon general. Rear Adm. Morton D. Willcutts, medical officer in command of the National Naval Medical Center, presented graduation certificates.

Civil Service Vacancies The Army Ordnance Department, at Aberdeen, Md., reports vacancies for two dental officers and a dental hygienist. The openings are for a Dental Officer, P-5 rating, which pays $6,235.20 a year, a Dental Officer, P-4, which pays $5,232 a year and for a Dental Hygienist, SP-5, which pays $2,724 a year. Further information may be secured by writing J. Emerson Craig, assistant chief, Employee Utilization Branch, Civilian Personnel Division, Ordnance Department Headquarters, Aberdeen Proving Ground, Md.

Navy Day Programs Held Naval installations throughout the country recently presented special Navy Day dental programs for service and civilian dentists. The programs included table clinics, Navy produced movies and conducted tours at the Naval Dental School, Bethesda, Md., Philadelphia Naval Hospital, Bremerton Naval Base, Seattle Naval Station, Memphis Naval Air Station, Parris Island Dental Dispensary and Great Lakes Naval Training Station. Particular emphasis was placed on attendance of the programs by dental students attending schools near the installations.

LATE ANNOUNCEMENTS

Two meetings usually listed in THE JOURNAL's announcement section but received too late for inclusion in this issue are:

Alpha Omega Fraternity's 41st annual convention will be held in Washington, D. C., Dec. 27-30. Bernard E. Gruber, 147 W. 42nd St., New York, is secretary.

Georgetown Dental Alumni Luncheon will be held at the Hotel Pennsylvania, in New York, Dec. 9. Guido S. Corriero, 6624 19th Ave., Brooklyn, N. Y., is in charge of reservations.

GENERAL NEWS

Physicians Prepare Anti-Trust Defense

Defendants in a civil anti-trust suit against the Oregon State Medical Society, the Oregon Physicians' Service, eight county medical societies and eight physicians are preparing answers to federal government charges that they have violated the Sherman anti-trust law.

The suit, filed by Attorney General Tom Clark in Federal Court at Portland, Ore., alleges that the defendants conspired to make it difficult for competitive medical care organizations (prepayment insurance systems) to operate in California and Washington as well as in Oregon. It also charges restraint of prospective subscribers from joining these "outside" plans; prevention of physicians from cooperating with them and restriction of hospital facilities used by physicians connected with plans.

The Federal Bureau of Investigation completed an intensive investigation of the matter before the suit was filed, according to reports from Washington, D.C.

Displaced Persons Arrive

Among the first 813 displaced persons to arrive in the United States from Europe under the government's program to admit 200,000 in the next two years, two were women dentists and at least two were dental technicians. A total of 18 were connected with the health professions and all were sponsored by religious or welfare organizations which promise to provide assistance in securing work for them.

Figures recently reported from Europe show that there are about 750 dentists, 1,600 physicians, 700 pharmacists, 2,600 nurses, 350 dental technicians and mechanics, 85 laboratory technicians, 300 physical therapists and 60 x-ray technicians among displaced persons in Germany, Italy and Austria.

Blue Cross Plans Report on Half Year

A total of $132,162,960 was paid to hospitals in the United States and Canada by 89 Blue Cross Plans for care of members during the first six months of 1948, the Blue Cross Commission of the American Hospital Association reported recently. This represents an increase of $33,652,590 over the same period last year. Combined operating expenses for all the plans totalled 10.8 per cent of the total Blue Cross income.

Pre-payment Medical Plan Is Studied

A report on medical and hospital services, designed to show the amount of care people request when the bill is paid for under a pre-payment arrangement, has been completed by Margaret C. Klem, Helen Hollingsworth and Zelma A. Miser for the Social Security Administration. The report is based on findings of a study conducted at Trinity Hospital, Little Rock, Ark. during 1941 and 1942.

During the first year, the study dealt with cases in which all services were received under a pre-payment arrangement while second year cases dealt with people who were required to pay a $.50 charge for each clinic visit.

The report is on sale at the Government Printing Office, Washington 25, D. C., at $1.00 a copy. Reprints of a digest of the report also are available.

CASES AND COMMENTS

Bilateral Dentigerous Cysts. By Irvin V. Uhler, D.D.S., Lancaster, Pa.

On February 2, 1948, a white woman, aged 27 years, was referred by her dentist for the removal of the lower right and left third molars. The patient had been experiencing vague pains along the right ramus for the past three months. The left side was asymptomatic. Intraoral roentgenograms were sent with the patient.

Clinically the oral cavity revealed nothing. The hygiene of the mouth was above average, the teeth were in a good state of repair and the investing tissues were healthy. Both lower first molars were missing, and there was some mesial inclination of the second molars. There was no evidence of the lower third molars by visual or manual examination. The depending lymph nodes were not palpable. The patient's temperature was 98.2 F., pulse 73 and blood pressure 130/88. There was nothing unusual in the personal or family history.

The accompanying roentgenograms revealed two unerupted third molars with a suspicious region behind each. Lateral jaw roentgenograms were made and they revealed large cystic regions distal to both teeth. The degree of uneruption of the teeth and the size of the cysts were singularly identical.

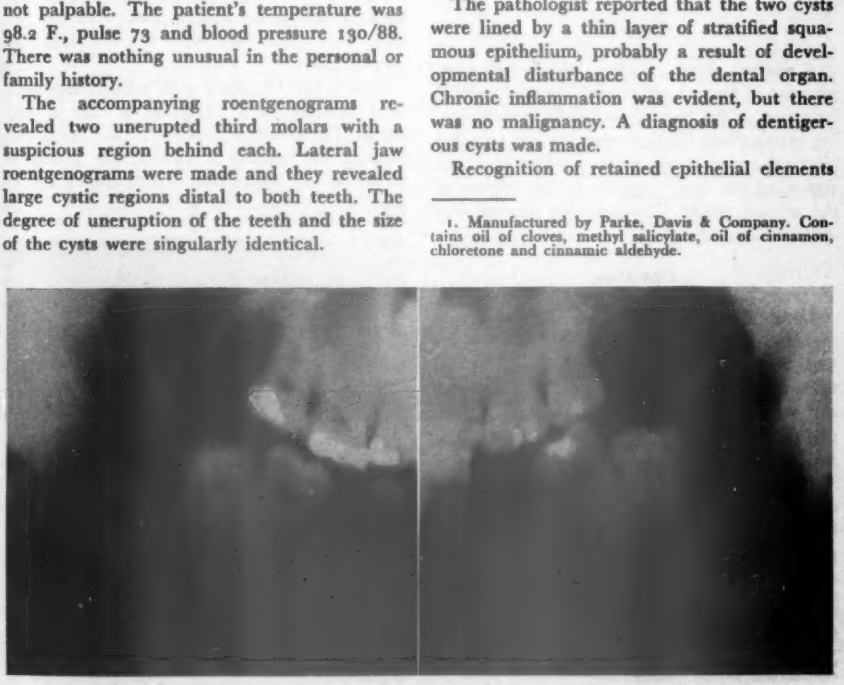
With the patient under local anesthesia, the impactions were removed and the cystic regions were enucleated carefully and sent to the pathologist for diagnosis. There was no fluid present. The cysts, which were grayish and tough, peeled out readily. Dentalone[1] drains were inserted and the defects were closed with black silk sutures. After forty-eight hours the drains were changed and the sutures removed. Ninety-six hours after the operation the drains were removed.

The left side presented no postoperative sequelae. On the right side were slight swelling and some pain for forty-eight hours. Both of these symptoms disappeared with change of drains and removal of sutures. At the time of writing (April, 1948) the patient was still asymptomatic, and the vague ramus pains experienced preoperatively were gone.

The pathologist reported that the two cysts were lined by a thin layer of stratified squamous epithelium, probably a result of developmental disturbance of the dental organ. Chronic inflammation was evident, but there was no malignancy. A diagnosis of dentigerous cysts was made.

Recognition of retained epithelial elements

1. Manufactured by Parke, Davis & Company. Contains oil of cloves, methyl salicylate, oil of cinnamon, chloretone and cinnamic aldehyde.



Lateral jaw roentgenograms showing two unerupted third molars with large cystic regions distal to each

is of utmost importance. Cahn[2] stated, "The dentigerous cyst is a potential adamantinoma." Thoma and Proctor[3] and Carpenter and Thoma[4] reported several cases of adamantinoma arising from cystic tissue posterior to impacted third molars. In the light of these findings it becomes the duty of the operator to cover in his roentgenographic study more than the tooth in question.

At the time of operation, all epithelial remnants must be removed completely. If this is not done, recurrence is inevitable, and such recurring tumors are apt to be more malignant than the original.—*548 North Duke Street.*

Torus Mandibularis: Report of a Case. By Maurice Fein, D.D.S., Chicago.

Torus mandibularis is a benign localized exostosis commonly found on the lingual surface of the mandible in the bicuspid and molar regions. The condition usually is bilateral and occurs more frequently in the female.

History

A woman, aged 47 years, with a full complement of lower teeth, complained of painful irritation in the lower part of the mouth during mastication. Clinical examination revealed bilateral and multiple tori extending from the region of the first bicuspid to the region of the second molar. The covering mucosa was inflamed and irritated.

Operation

Local anesthesia was used. The overlying mucosa was incised at the base of the tori just beneath the gingival tissue and was deflected lingually. The smaller and anterior tori were removed easily in one piece by applying the chisel at their bases. The large tori had to be chiselled away in thin slices. The area was then made smooth by means of bone files. The mucoperiosteum was laid back and sutured in place. The identical procedure was carried out on both right and left sides.

2. Cahn, L. R., The Dentigerous Cyst Is a Potential Adamantinoma. *D. Cosmos* 75:889 (September) 1933.

3. Thoma, K. H., and Proctor, C. M., Adamantinoma Developing from Odontogenic Cyst. *Internat. J. Orthodontia* 23:307 (March) 1937.

4. Carpenter, L. S., and Thoma, K. H., Adamantinoma Formed From a Radicular Cyst. *D. Items Interest* 55:716 (September) 1933.

Postoperative Course

There was no swelling or pain postoperatively although the patient had been cautioned to expect some difficulty. The sutures were removed on the third postoperative day.

Comment

The patient was pleased by the additional tongue room that removal of the tori afforded her and by the fact that during mastication the mucosa no longer became irritated.—*1354 West Devon Avenue.*

Denture Brush for One-Armed Person. By Bert L. Hooper, D.D.S., Lincoln, Neb.

A patient who wore dentures was unable to clean them himself after he lost an arm in an automobile accident. To solve the problem I devised a denture brush which requires the use of only one hand.

A plastic handbrush and two small suction cups were bought. Two holes an eighth of an inch in diameter were drilled in the back of the brush and tapped with No. 32 taps. The cups then were screwed into the tapped holes.

This brush equipped with suction cups will hold securely on a washbowl or sink of any shape. The denture is held in one hand and cleaned by rubbing it against the brush as shown in the illustration.—*1004 Sharp Building.*

Denture brush devised for one-armed person

A Broken Needle in the Vicinity of the Mandibular Sulcus.

By John M. Marré, D.D.S., St. Louis, Mo.

A middle aged woman of short and heavy stature was referred to the office on January 30, 1946, for the removal of a needle which had broken in the mandible three days before. Her dentist had reported that while he was attempting to give a mandibular injection for preparation of a cavity the patient jerked, causing the needle to break. Approximately 7 mm. of a 25 gage needle remained in the jaw.

I had learned previously of the Berman Locator, an electrical instrument used for locating foreign metal substances, based on the principle of radar. This machine when operating correctly will make a buzzing sound which increases in intensity as the finder approaches the metal object. It is effective on both noble and base metal. Arrangements were made to use this machine.

Examination

Examination of the patient's mouth revealed very thick, fleshy cheeks. She was in a highly nervous state. A partial trismus was evident and the general picture was not favorable. Premedication was administered.

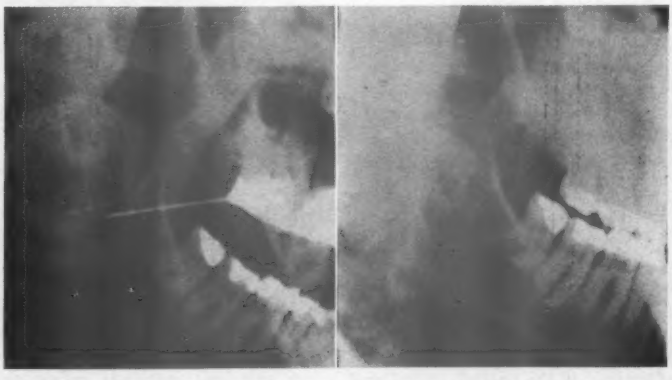
Lateral jaw and intraoral anterior and posterior roentgenograms were taken for the purpose of locating the needle. The anterior fragment of the needle was apparently distal and slightly inferior to the mandibular sulcus.

Operation

Block anesthesia supplemented by infiltration posterior to the sulcus was used. A notched diagnostic 19 gage needle was inserted in the direction of the fragment, new roentgenograms were taken and the number of notches inserted were recorded. This method gave additional information as to the distance of the fragment relative to the anterior border of the ramus.

A vertical incision 1 inch long was made through the mucosa and periosteum slightly posterior to the internal oblique line. By means of blunt dissection the buccopharyngeal fascia and the superior constrictor were retracted, along with the superior portion of the attachment of the internal pterygoid muscle. Careful elevation was maintained by remaining in close proximity to the lingual plate of the ramus in order to prevent injury to the lingual nerve. The region of the sulcus was reached, but no evidence of the needle was apparent. The tissues lingually were separated bluntly but still no evidence of the fragment was seen.

At this time the Berman Locator was employed and the needle was found in what could have been the sphenomandibular ligament. The needle fragment was withdrawn readily and the area was closed with interrupted dermal sutures. Other than considerable edema with associated trismus, the healing was uneventful.—*634 North Grand Boulevard.*



Lateral jaw roentgenograms. Left: Preoperative position of a broken needle in the region of the mandibular sulcus. Right: Postoperative view after removal of needle

Treatment of Hypertrophy of the Gingival Tissue Caused by Dilantin Sodium Therapy. By Samuel A. Brandon, D.D.S., Portland, Ore.

The patient, a white boy, aged 9, who weighed 80 pounds, first was seen in June, 1942. He had had epilepsy since babyhood and was taking diphenylhydantoin sodium (Dilantin sodium, Parke, Davis & Company) daily for the control of attacks. There was no parental history of epilepsy.

The boy appeared listless and without much interest in life. He was going to school but was backward in his studies. He had difficulty in masticating his food because of pain in the gingival tissue and had called for consultation for this reason.

Blood pressure, pulse, respiration, bleeding time and clotting time were normal.

Examination

The upper and lower lips were enlarged and showed considerable scarring where they had been bitten during attacks. There was generalized hypertrophy of the gingival tissue in the mandibular and maxillary lingual, labial and buccal regions. Only about ½ mm. of the cusps and incisal edges of the teeth were visible (Fig. 1, left).

A complete intraoral roentgenographic examination revealed a retarded dentition with many teeth, especially the anterior ones, forced out of alignment by the pressure of the hypertrophied gingival tissue.

Preoperative Preparation

The patient was given pentobarbital sodium grains 1½ an hour before the operation and atropine sulfate grain 1/150 a half hour before the operation. His face was washed with tincture of green soap and water followed by alcohol, and his mouth was rinsed with a 1 to 1,000 solution of potassium permanganate.

Operation

The lingual, inferior dental and long buccal nerves were anesthetized with a solution of 2 per cent procaine and 1 to 50,000 epinephrine. The maxillary region was anesthetized by infiltration on the palatal, buccal and labial aspects.

With a No. 15 Bard Parker knife the hypertrophied gingival tissue was excised approximately to the cemento-enamel junction on the buccal, labial and lingual aspects of the molars, bicuspids and anterior teeth. It was difficult to determine just where the cemento-enamel junction was, owing to the massive hypertrophy of the gingiva. The tissue in the interproximal regions of the teeth also was removed (Fig. 1, center).

Next a thick paste of suitable surgical cement was made. Each quadrant was dried thoroughly and the paste was packed firmly on the buccal, labial, lingual and interproximal regions and then irrigated with cold normal saline solution to cause the pack to harden quickly.

Postoperative Care

The patient was instructed to use ice packs during alternate thirty minute periods for the next six hours and normal saline irrigations every four hours throughout the day following the operation. Codeine sulfate grain ½ and Empirin compound grains 6 were given as required for pain.

The patient was seen every three days, and the gingival pack was removed after ten days. A mild astringent mouth wash of 0.5 per cent zinc chloride solution was used for four weeks thereafter, and the gingival tissue assumed a normal appearance (Fig. 1, right). The boy was pleased with his improved appearance and was better able to masticate his food. He was seen periodically and the teeth gradually began to assume better alignment.

After six months the gingival tissue again began to show enlargement, and in July, 1945, three years after the first operation, the hypertrophy was as great as before the operation. The boy, now 12 years old and more sensitive, was hospitalized on July 5, 1945.

Laboratory Examination

A blood examination revealed: coagulation time, two and three-quarters minutes; bleeding time, one and a half minutes; hemoglobin 79 per cent; erythrocytes 4,890,000 per cubic millimeter; leukocytes 11,100 per cubic millimeter; polymorphonuclear leukocytes 66 per cent; lymphocytes 14 per cent. Results of the serology test were negative.

A urinalysis revealed: yellow color; clear appearance; neutral reaction, and a specific gravity of 1.021.

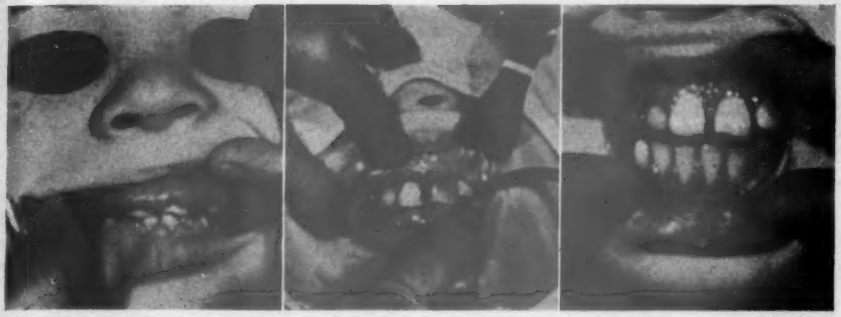


Fig. 1.—Left: Hypertrophy of the gingival tissue causing pain and difficulty in mastication. Center: Removal of tissue in gingival and interproximal regions. Right: Normal appearance of gingival tissue one month after operation

Second Operation

Pentobarbital sodium grains 1½ was given the night before the operation. No food was given on the morning of the operation. Pentobarbital sodium grains 1½ was administered at 7 a.m.; morphine sulfate grain 1/6 and atropine sulfate grain 1/250 at 7:30 a.m.

The face was washed thoroughly with tincture of green soap and water followed by alcohol, and the mouth was rinsed with tincture of merthiolate at 8 a.m. An operation similar to the one performed in June, 1942, was done. The tissue was sent to a pathologist for examination.

The gross specimen consisted of multiple linear irregular fragments of gingival tissue.

A histologic section showed a thickened squamous epithelium overlying loose and dense fibrous connective tissue. The subepithelial portion showed widespread lymphatic infiltration. There were patches of hyaline change in the underlying connective tissue.

The diagnosis was diffuse epithelial and connective tissue hyperplasia with chronic inflammation; benign.

Postoperative Care

Ice packs were applied to the face thirty minutes alternately for the next six hours. Milk was restricted; plenty of orange juice was given, and a liquid diet was followed. Mouth irrigations of hypotonic saline were given every four hours on the day after the

Fig. 2.—Left: Recurrence of hypertrophy two years after second operation. Center and right: Front and side views showing enlargement of upper and lower lips and facies of an epileptic child under Dilantin sodium treatment

operation. Codeine sulfate grain ½ and Empirin compound grains 6 were given as required for pain.

The patient was kept in the hospital until July 7, 1945, three days after the operation, and subsequently was seen periodically at the office. The gingival pack was removed after the tenth day and he had an uneventful recovery. He has been seen every six months. The pictures in Figure 2 taken in June, 1947, two years after the second operation, reveal recurring hypertrophy which will be removed in about a year.

Conclusion

1. A complete history (noting drugs taken) should be made of all patients who reveal abnormal conditions.

2. Hypertrophy of the gingival tissue may arise from many causes, and unless the etiology is known the diagnosis, treatment and prognosis are not certain.

3. Dilantin sodium therapy for the control of epilepsy causes the enlargement of the lips and progressive hypertrophy of the gingival tissue. No other tissue in the body apparently is affected.

4. This hypertrophy of the gingival tissue, although benign, recurs after its removal. Subsequent surgical removal every three or more years is necessary for the patient's comfort.

5. The hypertrophy probably is caused by the secretions of the by-products of Dilantin sodium from the salivary glands coming in contact with the epithelium and thereby causing a proliferation.—*Medical Dental Building.*

Removal of a Severely Impacted Lower Third Molar.

By R. O. Christensen, D.D.S., Oral Surgery Division, School of Dentistry, University of Minnesota, Minneapolis.

A well developed white woman, aged 38 years, who was bordering on hysteria, was referred by her physician on February 28, 1947. During routine intraoral roentgenographic examination, her dentist had discovered a severely impacted lower right third molar. He excitedly showed the roentgenogram to the patient and said he had never seen a tooth as severely impacted, and he asked the patient to permit him to take several more films at different angles at his own expense because of the unusualness of the case. The patient became very upset by this. The dentist was rather vague in his explanation as to how the case should be handled and further upset the patient. The patient, immediately after leaving the dental office, went directly to her physician for consultation about the tooth. The physician in turn referred the case to me.

Fig. 1.—Extraoral roentgenogram of severely impacted lower right third molar with region of decreased density around crown of impacted tooth

Examination

Intraoral examination revealed a clean and healthy mouth with a normal complement of 28 teeth. There was a very minute sinus of which the patient was completely unaware in the lower right third molar region. Extra- and intraoral roentgenograms revealed a severely impacted lower right third molar; the apices of its roots extended to the lower border of the body of the mandible. On palpation of the lower border of the mandible, there was a slight bulging of the lingual border in the region of the impacted tooth. It took some time to calm the patient and to explain that although this was an unusual type of impaction, it was by no means rare. The patient could be assured of a good end result from treatment.

A diagnosis was made of severe impaction of the lower right third molar, associated with an infected cystic region around the crown portion of the tooth and intraoral drainage.

The patient was admitted to Fairview Hos-

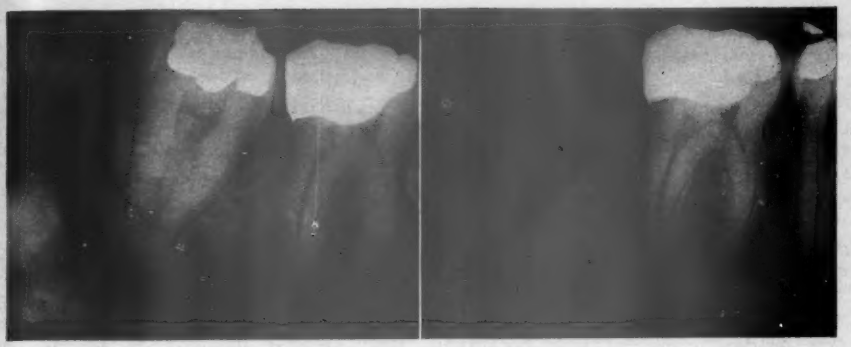


Fig. 2.—Intraoral roentgenograms. Left: Impacted lower right third molar. Right: Operative region showing healing of tissue and filling in of bony defect six months postoperatively

pital on March 16, 1947. The results of general physical examination were essentially negative.

The results of laboratory examination were as follows: a test of the urine gave an acid reaction; the quantity was insufficient for a test of specific gravity; there was a trace of albumin; the test for sugar was negative; 20 to 25 pus cells were present.

A test of the blood revealed: hemoglobin 84 per cent; leukocytes 10,450 per cubic millimeter; neutrophils 76 per cent; lymphocytes 19 per cent; monocytes 1 per cent, and eosinophils 4 per cent.

A serum diagnosis was negative.

Operation

A problem in surgical approach arose. The method of choice, if it had not been for the intraoral sinus, would have been removal by the extraoral method through the inferior border of the mandible. However, this approach was contraindicated in this case because of the infectious process and the porous condition of the bone surrounding the crown of the tooth which already was compounded into the mouth through the sinus in the region. For that reason it was decided to sacrifice the lower second molar to gain better access to the impaction.

On March 17, cyclopropane anesthesia was administered by the endotracheal route, and the lower right second molar was removed. An incision starting in the retromolar triangle area was carried forward along the crest of the alveolar ridge to the socket of the second molar. This incision was extended around the necks of the first molar and second bicuspid and then carried downward to the reflection of the mucobuccal fold. This flap was reflected, exposing the body of the mandible. With osteotomes and rongeur forceps the overlying bone was removed and the impacted tooth exposed and removed.

Around the crown of the impacted tooth was a region of necrotic granulation which was curetted. The flap then was returned and sutured in its normal position with No. 00 interrupted silk suture, and the wound was packed with petrolatum gauze.

Postoperative Treatment

Postoperatively there was a small amount of swelling. Pain was not too severe and fortunately there was no paresthesia of the lower lip. The patient was discharged from the hospital on March 21, and dressings were changed periodically until April 7, at which time healing had progressed to the point where the patient was discharged from our care.

On August 25, the patient returned for postoperative checkup, and the roentgenogram revealed the bony defect in the mandible to be filling in satisfactorily. The tissues over the operative region have healed completely and appear to be entirely normal.

This case illustrates the necessity for diplomacy as well as skill in handling unusual conditions.

BOOK REVIEWS

Practical Dental Assisting. By John Oppie McCall, D.D.S., F.A.C.D. 101 pages with 44 illustrations. Price $3.75. Index. Brooklyn: Dental Items of Interest Publishing Company, 1948.

The author, former director of the Murry and Leonie Guggenheim Dental Clinic and School for Dental Hygienists, remarks in the introduction that since procedures vary from office to office it would be confusing to elaborate on them in this text, hence his attempt to provide an untrained assistant with a basis of practical dental assisting is necessarily a limited one. The result places heavily the burden of deciding just what part the dental assistant plays in the operating room on the reader.

The aims, ideals and purposes of dentistry are well presented as are chapters on dental caries, micro-organisms of the mouth and dental roentgenology. Chapter eight, "Control of Infection," contains a concise description of the methods of sterilization employed in the dental office, but the care of instruments and equipment other than sterilization is not touched upon at all. The most frequently encountered dental instruments and appliances are illustrated and their uses described.

The American Illustrated Medical Dictionary. By W. A. Newman Dorland. 1660 pages, 880 illustrations with 233 portraits. Price $8.00. Thumb-indexed $8.50. Philadelphia and London: W. B. Saunders Company, 1947.

In this reviewer's opinion Dorland's heads the list of medical dictionaries because it is revised frequently and because it includes dental terms and defines them satisfactorily from the standpoint of dentistry.

Upon scanning Dorland's for selected dental terms which might be missing, your reviewer was gratified to find no omissions. Unfortunately, however, some of the dental information in the twenty-first edition was apparently copied from the twentieth edition without benefit of a dental editor. For instance, the term "fluorine" is followed by a brief definition and a "See" reference to "Enamel, mottled." Under the latter term we read "A chronic endemic dental fluorosis that is found in communities using a drinking water that contains *one part* or more of fluorine per million." As far as danger of mottled enamel is concerned, a dental editor would know that one part fluorine per million in drinking water is now considered a safe content.

Eponyms, or diseases and appliances named after people associated with them, are sometimes misleading. "Black's crown," cited next to the portrait of Dr. G. V. Black on page 223, probably is the least important of the ten or more eponyms indicative of Dr. Black's achievements to be found in dental dictionaries.

Despite these criticisms, however, Dorland's American Illustrated Medical Dictionary should be a profitable investment for the dentist who additionally includes a good dental dictionary in his library.—*Madelene Marshall.*

Motivation in Health Education. By Iago Galdston, M. D.; W. W. Bauer, M.D.; Lawrence S. Kubie, M.D., and Margaret Mead, Ph.D. 53 pages. Price $1. New York: Columbia University Press, 1948.

To be effective, health education must include both reliable data and desirable motivation and this book deals with the latter. Four distinguished authors present respectively the viewpoints of the health educator, the physician, the psychiatrist and the anthropologist.

The authors consider the dependency of human behavior on a multitude of circumstances and any reader who imagines that knowledge alone directs action may be enlightened.

Advocates of rewards in health education programs will have cause to hesitate after reading Dr. Mead's comments. She shows that while giving gold stars for good health habits may please and stimulate the individual child, it also tends to prevent the child from exercising his own free will.

The dental practitioner will gain much by familiarizing himself with the opinions of these four authorities, since every dentist employs some chair-side teaching. In this connection, a statement of Arthur H. Steinhaus[1] deserves mention: "To become a better teacher one should: (1) know what gives joy or

1. Steinhaus, Arthur H., *More Firepower for Health Education*, Office of Education Bulletin 1945 No. 2. Washington, D. C.: U. S. Government Printing Office.

pleasure and what gives pain to the one he would teach; (2) be authoritatively informed of the facts that should be translated into action and (3) develop the art of guiding the learning experience so that feeling and ideas become appropriately associated in the learner."—*J. M. Wisan.*

Emotional Maturity: The Development and Dynamics of Personality. By Leon J. Saul, M.D. 327 pages. Index. Price $5.00. Philadelphia: J. B. Lippincott Company, 1947.

The jacket on this book states that it is an exposition of the basic facts concerning neuroses, presented in understandable fashion. The book achieves this aim in part. It has the virtue, like most recent works of this type, of divorcing mental lesions from the stifling and static concepts of psychiatry which are still saddled on students in many medical and dental schools. Dr. Saul is interested not so much in what symptoms a particular patient presents, but in the forces that made him what he is. His monograph thus deals with the kinetics or genetics of psychiatric illness.

The concepts of modern psychobiology are dealt with in chapters on hostility, need for love, dependence and independence, persistence of childhood patterns, sexual drive, ability to grasp reality, and so on. The impact of these factors on the developing personality is adequately detailed. The treatise is studded with case histories demonstrating how the application or perversion of these forces supplies the key to the understanding of the neurosis or psychosis which results.

The book is psychoanalytically oriented, but this should be no deterrent to students of other systems, since modern psychokinetics is so thoroughly imbued with concepts of the Freudian school as to be unintelligible without them. Psychiatrists in general probably would agree with most of the principles that Dr. Saul expounds. With regard to some, there might be grounds for controversy. The author discusses conscience, for example, entirely as a natural phenomenon, to the exclusion of religious or divine influences. It is not unlikely that there is an increasing awareness on the part of thinkers of the importance of these influences on our mental health, or lack of it, today.

Much of the cogency of the book is lost, on the other hand, because of the manner in which the material is handled. Karl Menninger recently exhorted his fellows to free themselves of their mysticism and esotericism and to become a bit more earthy and clinically practical. Dr. Saul has chosen a rambling and verbose style with a generous use of traditional psychoanalytical "gobbledegook." On page 129, as an example, this passage occurs: "The childish, dependent trends can influence the strength and quality of the sexual current. When these trends are strong, there is usually an overt or latent impairment of the heterosexual functioning. That is, one factor tending toward impotence or frigidity in certain cases is the passive-receptive-dependent tendency; while, conversely, a strong interest usually provides a certain safeguard against too childish dependence." This type of writing is all too common. The usefulness of succeeding editions would be augmented by a recasting of these passages, and by the addition to each chapter of a summary of the principle discussed, in a style comprehensible by one without specialized training. The case histories should be set apart from the main text to allow more rapid reading and easier use of the book as a reference.

"Emotional Maturity" will be helpful to those in need of more than a casual knowledge of basic psychiatry. It is doubtful if the lay reader would surmount the formidable manner of presentation.—*Charles Hillenbrand, M.D.*

CURRENT LITERATURE

Mass Control of Dental Caries Through the Use of Domestic Water Supplies Containing Fluorine. Frederick S. McKay. Am. J. Pub. Health 38: 828, June 1948.

The author reports on the caries experience of natives of continuous residence in the city of Colorado Springs, Colo., which has obtained its water supply from the same source for 70 years. The water has fairly consistently maintained a level of 2.6 ppm of fluoride since the first determinations were made several years ago.

The average decay experience rate for the entire group was 2.98, and 35 per cent of these persons had experienced no decay whatever. Average age of the group was about 25 years.

Age groups 10 to 14 and 15 to 19 showed decay experience rates of 1.09 and 1.51 respectively, the decay being practically limited to molar pits and fissures. Of 1,192 teeth with caries experience, only 45 were incisors or cuspids.

Once acquired, the inhibitory effect of fluorine is permanent and is not diminished by later migrations. The degree of fluorosis was classified as "mild" in 137 of the first 300 persons examined and their average caries experience rate was 2.46, with 40 per cent of this group being caries-free.—*James Springer.*

Dental Logistics in Amphibious Operations. Frances G. Ulen. U. S. Nav. M. Bull. 48:528, July-August 1948.

Any great war of the future will be attended by problems of dental logistic support similar to those encountered during World War II. Methods previously used which should be employed again include: (1) multiple watches of dental personnel aboard combatant vessels and tenders, (2) inclusion of dental sections in tables of organization of Marine Corps divisions and (3) provision of dental service in construction units similar to the dental sections of Marine Corps divisions.

Additional methods which should be employed include: (1) development of field dental equipment capable of being readily and effectively moved by the personnel assigned to man it, (2) procurement of reserve dental units to the number authorized, the training of these units and their integration into war plans and (3) determination of physical facilities required for the use of dental personnel of the Navy and the Naval Reserve, including floating fleet dental clinics, and the timely provision of these facilities.—*James Springer.*

Activities of Twenty-two Antibacterial Substances Against Nine Species of Bacteria. Frederick Kavanagh. J. Bact. 54:761, December 1947.

This article reports the activity of 17 naturally occurring and 5 synthetic antibacterial substances against 9 kinds of bacteria, as determined by the serial dilution method. By testing an antibiotic substance with these 9 species it is possible to identify it quickly and with a good deal of certainty, as contrasted with the more accurate but time consuming method of isolation in pure form followed by chemical identification.—*George W. Burnett.*

Journal of Oral Surgery
January 1948

Titles marked with an asterisk are reviewed below by H. L. Hubinger.

***Measurements for Intra-oral Block of the Maxillary Nerve.** Niels B. Jorgensen, Los Angeles. —1.

***Present Status of Arthrosis of the Temporomandibular Joint.** Don H. Bellinger, Detroit.—9.

***Odontogenic Infections of the Jaws: Their Treatment With Antibiotics.** Kurt H. Thoma, Boston. —17.

***Histologic Comparisons of Localized Fibrous Dysplasia of Bone and Ossifying Fibroma.** Clayton K. Mammel, Ann Arbor, Mich.—27.

The Use of Oxidized Cotton in Dental Hemostasis. Alvin S. Nathan, New York.—37.

***Ankylosis of the Temporomandibular Joint.** Douglas B. Parker, New York.—42.

***Maxillary Antrum Complications in Exodontia.** Bernard G. Wakefield, Buffalo.—51.

***Cysts and Fistulas of the Branchial and Thyroglossal Ducts.** Fred Balycat, Los Angeles.—60.

***General Anesthesia in Oral Surgery and the Nurse Anesthetist.** Editorial. Carl W. Waldron. —65.

***Bilateral Resection of the Mandible to Correct Prognathism.** James R. Cameron and J. J. Stetzer, Jr., Philadelphia.—69.

Chorea With Associated Dental Infection. Stephen P. Mallett, Boston.—72.

Accidents of Dental Origin: Foreign Bodies in the Bronchi and Stomach. Ralph W. Edwards, Kansas City, Mo.—75.

***Squamous Cell Carcinoma of the Tongue as a Sequel to Leukoplakia.** Malcolm Wallace Carr, New York.—78.

***Removal of All Teeth and Alveolectomy Coincidental With Cerebral Accident.** Edward C. Thompson, Urbana, Ill.—81.

Osteomyelitis With Destruction of the Coronoid Process and Subsequent Regeneration. Alvin L. Armer, Hollywood, Calif.—83.

***Cavernous Hemangioma of the Soft Palate.** James B. Smith, Danville, Pa.—85.

***Multiple Fractures of the Mandible in a Child.** Edward Reiter, Cleveland.—87.

Bilateral Fracture of the Maxilla. Paul H. Hamilton, Los Angeles.—90.

Measurements for Intra-oral Block of the Maxillary Nerve. Niels B. Jorgensen.

After studying measurements on many skulls, Jorgensen has concluded that the distance from the infra-orbital margin to the gingival margin of the second bicuspid is equivalent to the distance from the inferior orbital fissure to the gingival margin of the second molar. This fact is applicable to intra-oral block of the maxillary nerve.

Clinically, it is possible to measure the facial distance with a caliper, applying one point to the infra-orbital margin and the other to the gingival margin of the second bicuspid. The distance then is marked off on the 20 gage bent needle with a movable marker, and the needle is inserted until the marker is opposite the gingival margin of the second molar.

Present Status of Arthrosis of the Temporomandibular Joint. Don H. Bellinger.

Noninflammatory disease conditions of the temporomandibular joint, characterized by disturbances in its function, have been described under different names. The term "temporomandibular joint arthrosis," suggested by Boman, would seem to designate the disease properly, especially as the changes are of the arthritis deformans type.

If it were possible adequately to visualize the joint in a roentgenogram, the following details should be taken into consideration: (1) the general form of the condyle, its convexity, marginal spines and detached calcific bodies; (2) the inclination of the collum; (3) open or closed form of the joint; (4) the inclination of the tubercle and its convexity; (5) the size of the joint space, and (6) the position of the condyle in the joint.

Of the special roentgenographic technics that have been evolved in an attempt to visualize the temporomandibular joint more clearly, arthrography would seem to have the greatest possibility. This technic employs the injection of a radiopaque contrasting medium into a single joint space at a time, after which roentgenograms are made of the joint in both the open and the closed position.

The author, after reviewing the various methods by which arthrosis of the temporomandibular joint has been treated, suggests that most of them are ill-founded and that there is no correlation between the symptoms and treatment.

Odontogenic Infections of the Jaws: Their Treatment With Antibiotics. Kurt H. Thoma.

The author stresses the importance of knowing the offending organisms in cases of infections of dental origin. Both aerobic and anaerobic cultures are essential, and a smear should be examined for Vincent's organisms. The bacteria most commonly found in infections of the jaw and neck are alpha and beta hemolytic streptococci, nonhemolytic streptococci, Staphylococcus aureus and Staph. albus. Additional organisms which may be found in mixed infections include bacterioids, Bacillus perfringens, B. ramosus, B. coli, and other gram-negative bacilli and clostridia.

Several cases are reported in which selection of antibiotics for treatment was based on bacteriologic examination. The author favors removal of the involved teeth and sequestrums as soon as the patient has attained the proper blood level of the antibiotic. Local irrigation with penicillin is recommended in treatment of osteomyelitis. Irrigation of fistulas with an aqueous solution of chlorophyll proved useful in raising local tissue resistance in a case of anaerobic infection.

Histologic Comparisons of Localized Fibrous Dysplasia of Bone and Ossifying Fibroma. Clayton K. Mammel.

The purpose of this paper is to correlate the multiple and duplicate terms which have been used in the identification of benign bone lesions heretofore classified as ossifying

fibroma, fibro-osteoma and fibrous dysplasia of bone. These terms are used to describe various phases of a single pathologic process, which is distinguished from von Recklinghausen's disease and Paget's disease.

In the histologic study the ossifying fibroma usually does not show giant cell activity and the tendency is toward the osteoma type of bone tumor. Fibrous dysplasia usually shows a marked predominance of fibrous connective tissue. The two, fibrous dysplasia and ossifying fibroma, should however be considered as variants of one neoplastic process.

Mammel believes that even though these tumors tend to recur with high frequency they should not be operated on radically. He concludes that the term *fibrous dysplasia* should earn a rightful place in diagnostic nomenclature.

Ankylosis of the Temporomandibular Joint. Douglas B. Parker.

A surgical technic for treatment of bony ankylosis of the mandible is described. Parker favors a two stage operation when both sides are involved.

In brief, an inverted L-shaped incision is made over the joint. The horizontal incision is made from the lobe of the ear along the lower border of the zygoma for about 3 cm. A vertical incision is carried downward about 2½ cm. from the posterior end of the horizontal incision. The bone is cut through with mallet and chisel at about the level of the sigmoid notch. After the ramus has been cut the upper segment of bone is separated out with broader chisels and a mallet.

The space is packed with iodoform gauze which serves as a dependent drain, aids in controlling hemorrhage and stimulates granulation. It is removed gradually over a period of about three weeks. A posterior bite block is wired in position and left for a week after resection.

Maxillary Antrum Complications in Exodontia. Bernard G. Wakefield.

The author recommends and describes the operation that involves making a window in the buccal wall of the sinus for recovery of a displaced root or tooth. He warns against attempting to recover roots through an enlarged alveolus.

Other topics discussed are puncture of the antral floor, closure of an opening between alveolus and antrum, treatment of chronic antro-oral fistula, and fracture of tuberosity and antral floor.

Cysts and Fistulas of the Branchial and Thyroglossal Ducts. Fred Balyeat.

The embryology, classification, pathology and differential diagnosis of branchial cysts and fistulas are presented. Operation usually is the best mode of treatment of these anomalies.

The author concludes that all lumps or swellings in the mouth or submandibular regions must be considered as possible branchial cysts or fistulas, or both; and if the swelling occurs in the midline the possibility of cysts and fistulas of the thyroglossal duct must be considered.

General Anesthesia in Oral Surgery and the Nurse Anesthetist. Editorial. Carl W. Waldron.

The editor reviews criticism of the resolution made by the American Society of Anesthesiologists to the effect that only doctors of medicine should be trained in the science and art of anesthesia.

Oral surgeons have great need of the trained nurse anesthetist, but as a group they are faced with the problem of future replacements of nurse anesthetists and the question of responsibility in a highly specialized field of endeavor. The answer to this problem is not immediately forthcoming and has been made much more difficult by the premature and apparently ill-conceived activities of the anesthesiologists in a period of critical scarcity of anesthetists.

The situation warrants immediate study and discussion on the part of organized oral surgery in order that effective arrangements may be made for the adequate training of nurse anesthetists for the specific needs of oral surgery.

Bilateral Resection of the Mandible to Correct Prognathism. James R. Cameron and J. J. Stetzer, Jr.

The authors report a case of mandibular prognathism that was treated by resection in three operations. Tantalum saddles with circumferential wiring were used to support interosseous wiring at the fracture lines. The saddles were subsequently removed and remarkable tissue tolerance of tantalum was noted. On one side the continuity of mandib-

ular nerve and vessels was maintained, while on the other they were severed.

Cameron and Stetzer conclude that it is not necessary to attempt this procedure in two or three operations, and the block resection around the nerve is of no particular advantage. Regeneration of the nerve usually occurs within three months after it is severed.

Squamous Cell Carcinoma of the Tongue as a Sequel to Leukoplakia. Malcolm Wallace Carr.

A case is reported in which carcinoma of the tongue developed from a long-existing lesion of papillary leukoplakia. Reaction to the Wassermann test was 4 plus on the first visit, before development of the carcinoma, but four years later reaction was negative to tests for syphilis. No history of antisyphilitic treatment was given, and the author was unable to explain the results.

The patient was treated, apparently successfully, with roentgen rays to the neck and a total cautery glossectomy.

The author concludes that leukoplakia is a precancerous lesion with an ultimate tendency toward malignancy.

Removal of All Teeth and Alveolectomy Coincidental With Cerebral Accident. Edward C. Thompson.

A white man, aged 71, had symptoms of toxic vertigo or cerebral injury. Though the latter diagnosis was considered, the spinal fluid was normal, so infected mandibular teeth were extracted and conservative alveolectomy was performed. Four days later the patient became comatose, and craniotomy revealed a chronic subdural hematoma which had resulted from a blow several weeks before. The change in the patient's condition was caused by osmosis through the clot wall which caused expansion of the clot and compression of the brain.

The case illustrates one of the hazards of undertaking oral surgical procedures on patients thought to be suffering from toxic vertigo.

Cavernous Hemangioma of the Soft Palate. James B. Smith.

The author reports a case of cavernous hemangioma of the soft palate that was successfully treated with several injections of sclerosing solution at approximately one month intervals.

Stress is placed on the importance of recognizing this type of tumor without surgical intervention, because of the danger of hemorrhage. Attempt may be made at aspiration with a fine gage needle if diagnosis is in doubt.

Multiple Fractures of the Mandible in a Child. Edward Reiter.

A 7 year old boy with multiple fractures (one in the region of the symphysis mandibulae and one in the neck of each condyle) presented a problem in treatment as the usual methods of reduction would not serve.

A Kirschner pin was drilled through the symphysis to hold the anterior fragments in alignment. A plaster head cap was made, with a wire coat hanger incorporated in it. The hook of the hanger was bent down in front of the face and rubber bands were stretched from the hook to each end of the Kirschner pin, to furnish traction for reducing the condylar fractures. The boy was able to masticate soft food during the six weeks of treatment.

Journal of Oral Surgery
April 1948

Titles marked with an asterisk are reviewed below by H. L. Hubinger.

*Actinomycosis: Treatment of Five Cases. Rieva Rosh and Harry M. Seldin, New York.—93.
*Cancer of the Floor of the Mouth. James B. Smith, Danville, Pa.—106.
*Two New Hemostatic Agents, Used Alone and With Aids. Alvin S. Nathan.—116.
*Methods of Fixation of Jaw Fractures and Their Indications. Kurt H. Thoma, Boston.—125.
*The Pterygopalatine Injection for Blocking of the Maxillary Nerve. Leonard Szerlip, Morristown, N. J.—135.
*Operation for the Repair of Oral-antral Fistulae. Erwin W. Ferber, C. Dudley Gwinn and David H. Grimm, San Francisco.—139.
*Surgical Emphysema After Tooth Removal. Ralph W. Edwards, Kansas City, Mo.—147.
Venipuncture Technic. Adrian O. Hubbell, Carl J. Reimer and Francis Lucchetti, Long Beach, Calif.—150.
*Uses and Abuses of Skeletal Fixation. Don E. Woodard, Kansas City, Mo.—154.
*Management of Difficult Extractions. Guy L. Haman, Reading, Pa.—157.
The Use of Drugs in Emergency Cases. H. L. Hubinger, Saginaw, Mich.—162.

*Hemangioma of the Cheek. Daniel J. Holland, Jr., Brookline, Mass.—167.
Enucleation of a Dentigerous Cyst With Retained Vitality of Teeth. Sheldon I. Brockett, San Diego.—169.
*Osteomyelitis of the Ascending Ramus of the Mandible. Edward C. Thompson, Urbana, Ill.—171.
*Manifestation of Paget's Disease in the Maxilla. Paul H. Hamilton, Los Angeles.—175.
Osteomyelitis: A Case of Confusing Etiology. Alvin L. Armer, Hollywood, Calif.—177.
Condylomata Lata of the Tongue in Congenital Syphilis. Malcolm Wallace Carr, New York.—179.

Actinomycosis: Treatment of Five Cases. Rieva Rosh and Harry M. Seldin.

The theory that actinomycosis may be contracted by chewing straws, grasses and so forth, or by contact with infected domestic animals, is not well founded since this hypothesis does not fit the clinical picture. The bovine form of the disease often produces lesions of the bony structures, whereas the disease in human beings is a peripheral type which rarely, if ever, penetrates beyond the soft tissues.

A valuable diagnostic feature of the disease is that the cervical lymph nodes rarely, if ever, are involved. Diagnosis is based specifically on discovery of the sulfur granules on direct examination, or culture of the exudate for ray fungus.

Five cases are reported. The best treatment appears to be a combination of external surgical drainage, roentgenotherapy in small dosage, massive doses of potassium iodide up to the point of tolerance, and administration of antibiotics.

Cancer of the Floor of the Mouth. James B. Smith.

The author thoroughly covers all phases of cancer of the floor of the mouth.

It may be said that, in general, treatment of cancer of the floor of the mouth has become a roentgenologic problem because of the success of this form of therapy and because of the severe deformity which follows radical surgery. Occasionally radical surgery may be used with good results.

One widely accepted method of roentgenotherapy is the type known as "perioral x-radiation." This method utilizes metal tubes connected to the roentgen unit and inserted in the mouth so that the irradiation is directed to the desired area. This method allows a greater concentration of the ionization effect of the rays in the tumor itself.

Two New Hemostatic Agents, Used Alone and With Aids. Alvin S. Nathan.

The use of absorbable gelatin sponge with thrombin and of oxidized cellulose for control of hemorrhage following extractions is described and 8 cases are reported in detail.

The author favors the use of absorbable gelatin sponge with thrombin because of its superior ability in controlling hemorrhage, a smaller incidence of swelling, no ecchymosis and no visible tissue reaction.

Methods of Fixation of Jaw Fractures and Their Indications. Kurt H. Thoma.

The author describes transosseous wiring, the use of bone plates, fixation by internal wiring, transfixation with Steinmann pins, and skeletal fixation with pins and clamps for complicated fractures of the jaw.

A peripheral bone clamp, developed by the author and used alone or in conjunction with skeletal pin fixation is described and illustrated. With the exception of the Frac-Sure appliance, a modified Roger Anderson type of skeletal pin fixation, the author states that the methods of fixation described only prevent displacement of the fragments and are not sufficiently effective to prevent motion in the fracture when the jaw is used.

The Pterygopalatine Injection for Blocking of the Maxillary Nerve. Leonard Szerlip.

The author uses a 25 gage needle 1½ inches in length with a Luer-Lok syringe to enter the greater palatine foramen for unilateral maxillary block anesthesia. Measurement of the depth of needle insertion is determined by employing methods previously described by Jorgensen.

The author concludes that the dangers of blocking the maxillary nerve through the pterygopalatine canal are far less than those of any other approach.

Operation for the Repair of Oral-antral Fistulae. Erwin W. Ferber, C. Dudley Gwinn and David H. Grimm.

The causes of openings from the oral cavity into the maxillary sinus are reviewed and precautions are suggested to prevent permanent openings.

The palatal flap operation is described in detail. Use of a clear acrylic palatal splint is recommended for protection of the flap.

Surgical Emphysema After Tooth Removal. Ralph W. Edwards.

The author reports a case of surgical emphysema that followed removal of an impacted mandibular third molar. Half an hour after termination of the operation the patient had occasion to blow his nose vigorously. Immediately thereafter swelling occurred in the left cheek, and palpation revealed crepitation over the distribution of the masseter muscle and anteriorly to the commissure of the lips. The area of emphysema became much more extensive during the next few hours and he entered the hospital the next day. In this case bed rest was ordered but no therapy was instituted, and the symptoms had disappeared three days later.

Uses and Abuses of Skeletal Fixation. Don E. Woodard.

Many of the troublesome complications attendant on the use of skeletal pin fixation methods of fracture reduction are enumerated. Necrosis about the pins, injury to the mandibular nerve and resultant scars of the skin are a few of those mentioned.

The author concludes that honest consideration should delegate this method to a place where it rightfully belongs. Its use should be limited to a sphere where its advantages overshadow its complications.

Management of Difficult Extractions. Guy L. Haman.

Discussed in this article are roentgenographic examination, premedication, anesthetic agents, preoperative care, operative procedure, postoperative care and instruments. Conditions which cause complications are listed.

The author recommends the use of a mixture of equal parts of sulfanilamide and sulfathiazole powder to which 20,000 units of penicillin powder has been added for a dusting powder in extraction sites.

Hemangioma of the Cheek. Daniel J. Holland, Jr.

A case is reported in which the provisional diagnosis was hyperplastic buccinator lymph node related to chronic infection around a retained root fragment. Operation was performed and microscopic examination revealed that the mass was a hemangioma.

Osteomyelitis of the Ascending Ramus of the Mandible. Edward C. Thompson.

Thiopental sodium was administered to a man, aged 62, preparatory to performing a complete mandibular alveolectomy. The procedure was interrupted ten minutes after a normal induction because of cessation of respiration, accompanied by sudden marked cyanosis. Approximately 18 cc. of 2.5 per cent solution of the anesthetic agent had been administered. The patient was revived after considerable effort and the remaining teeth were removed using local anesthesia.

Osteomyelitis developed in the left ramus of the mandible and was treated with penicillin, drainage and removal of a piece of sequestrated bone.

The author believes that the anesthetic complications may have occurred because the patient was mildly diabetic. Osteomyelitis was probably caused by contamination of the operative field during the efforts to resuscitate the patient.

The value of early and adequate administration of penicillin in cases of osteomyelitis is stressed.

Manifestation of Paget's Disease in the Maxilla. Paul H. Hamilton.

A case of Paget's disease in a colored woman, aged 67, is reported because the maxillary changes are of interest. The maxillary bone revealed zones of almost uniform diffuse increase in density in which there was a very fine, trabecular pattern. In the upper right molar region was an area with several apparently nodular sclerotic portions.

Resorption of the alveolar process had occurred around the remaining teeth. Of the 6 remaining maxillary teeth, 5 showed hypercementosis (2 bicuspids, the cuspids, and a central incisor). In the mandible only the bicuspids gave evidence of hypercementosis.

A microscopic examination is included in the report.

LIST OF DENTAL OFFICERS

SEPARATED FROM NAVY DENTAL CORPS

THE following naval dental officers have been separated from service, according to lists received from the Navy Department. These lists are not complete. Other names will be published as soon as possible.

Alabama		
New Brockton	Gunter, Jr., Guy F.	Lieut.
Tuscaloosa	Roberts, Cullen J.	Lieut.
Arkansas		
McGehee	Maxwell, Alonzo V.	Lieut.
California		
Alameda	Paden, William W.	Lieut.
Chico	Landis, Fred S.	Lieut.
Glendale	Moffat, Richard P.	Lieut.
Huntington Park	Reimann, Jr., Wm. O.	Lieut.
Long Beach	Walker, Robert V.	Lieut.
Los Angeles	Barnett, Robert A.	Lieut.
Los Angeles	Danno, Vincent	Lieut.
Los Angeles	Ellis, Frank N.	Lieut.
Los Angeles	Fetter, Jr., Harold P.	Lieut.
Los Angeles	Fuschetti, Arthur J.	Lieut.
Los Angeles	Lundgren, Carl G.	Lieut.
Los Angeles	MacArthur, Seth G.	Lieut.
Los Angeles	Sagehorn, Jr., E. G.	Lieut.
Los Angeles	Schleuniger, A. X.	Lieut.
Los Angeles	Sheranian, Nisnan H.	Lieut.
Los Angeles	Topper, Morton M.	Lieut.
Montebello	Ingle, Jr., Russell J.	Lieut.
Norwalk	Mills, James F.	Lieut.
Oakland	Blankstein, Marvin	Lieut.
Oakland	Nielsen, Harold W.	Lieut.
Oakland	Semonsen, Robert M.	Lieut.
Ocean Beach	Ungricht, William D.	Liuet.
Palo Alto	Altieri, Domenico	Lieut.
Pasadena	Garner, Donald E.	Lieut.
Pasadena	Hays, Clifford R.	Lieut.
Pasadena	Weignad, Eugene P.	Lieut.
San Diego	Brigante, Robert F.	Lieut.
San Diego	Gamboa, George C.	Lieut.
San Jose	Morton, Warren B.	Lieut.
Santa Monica	Phillips, George	Lieut.
Stockton	Bewley, Jr., Ross E.	Lieut.
Connecticut		
Danbury	Marvin, George	Lieut.
New Britain	Fletcher, Jr., W. R.	Lieut.
Stratford	Kiernan, Francis A.	Lieut.
Torrington	Novey, Ernest E.	Lieut.
Florida		
Daytona Beach	Browning, William E.	Lieut.
Miami	Baker, Jr., Clifford F.	Lieut.
Sanford	Epps, Aubrey W.	Lieut.
Tampa	King, Henry G.	Lieut.
Idaho		
Orofino	Tucker, Richard V.	Lieut.
Rigby	Johnson, Max R.	Lieut.
Illinois		
Bloomington	Dillman, Wilbur L.	Lieut.
Chicago	Alverdy, Emanuel F.	Lieut.
Chicago	Baker, Arthur E.	Lieut.
Chicago	Brauer, Frank J.	Lieut.
Chicago	Feld, Julius	Lieut.
Chicago	Hilton, Jr., John R.	Lieut.
Chicago	Knuth, Albert R.	Lieut.
Galesburg	Cole, Robert J.	Lieut.
Jerseyville	Lewis, John D.	Lieut.
Lake Bluff	Dalitsch, Walter W.	Cmdr.
Mounds	Campbell, Clyde N.	Lieut.
Mt. Vernon	McAtee, William N.	Lieut.
Watseka	Dowsett, Charles P.	Lieut.
Indiana		
Fort Wayne	Sturm, Robert J.	Lieut.
Greencastle	Seller, Hubert A.	Lieut.
Indianapolis	Carrice, George L.	Lieut.
Montpelier	Garrett, Dwight A.	Lieut.
Terre Haute	Boone, Malcolm E.	Lieut.
Terre Haute	Kipple, Eugene R.	Lieut.
Wakarusa	Gerber, Max L.	Lieut.
Whiting	Chalko, Alexander J.	Lieut.
Iowa		
Corwith	Severns, Byron S.	Lieut.
Council Bluffs	Larson, Gerald P.	Lieut.
Fort Dodge	Chernausek, D. S.	Lieut.
Monona	Silverman, David	Lieut.
Waterloo	Donovan, Robert W.	Lieut.
Kansas		
Cummings	Cassidy, Joseph M.	Lieut.
Kansas City	Hrelac, Arthur D.	Lieut.
Manhattan	Sager, Robert F.	Lieut.
Louisiana		
Baton Rouge	Bacot, Jr., Frank M.	Lieut.
New Orleans	Charvet, Emile J.	Lieut.
New Orleans	DiGrado, Salvatore R.	Lieut.
New Orleans	Foreman, John S.	Lieut.
Massachusetts		
Boston	Casper, Murray H.	Lieut.
Boston	Freeman, Joseph I.	Lieut.
Brighton	Reinhalter, N. W.	Lieut.
Fall River	Robinson, R. E.	Lieut.
Fitchburg	Rice, Murray A.	Lieut.
Framingham	Carchio, John J.	Lieut.
Lawrence	Schmidt, Raymond J.	Lieut.
Mattapan	Nathan, Jerome R.	Lieut.

Melrose	Graf, William H.	Lieut.
Methuen	Hyde, Kenneth R.	Lieut.
North Brookfield	Sullivan, Matthew J.	Lieut.
North Easton	Tait, Robert H.	Lieut.
Orange	Salusti, Joseph J.	Lieut.
Roslindale	Thomas, Edwin M.	Lieut.
Somerville	Henderson, George F.	Lieut.
Springfield	Gold, Seymour	Lieut.
Springfield	Morgan, Warren A.	Lieut.
Stoughton	Burnham, John F.	Lieut.
West Somerville	McNeil, John F.	Lieut.
Wilmington	Black, Jr., Charles H.	Lieut.
Michigan		
Allegan	Schelhas, Charles H.	Lieut.
Detroit	Vernier, Floyd L.	Lieut.
Ferndale	Duncan, Jr., R. W.	Lieut.
Royal Oak	Kezlarian, Henry G.	Lieut.
Minnesota		
Bovey	Nurmi, Clarence O.	Lieut.
Duluth	Anderson, Robert J.	Lieut.
Minneapolis	Anderson, Jack L.	Lieut.
Minneapolis	Baken, Jr., Melvin P.	Lieut.
Minneapolis	Stella, Liborio J.	Lieut.
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Salt Lake City	McDermaid, Henry G.	Lieut.

DEATHS

McCarthy, Jeremiah E., Fond Du Lac, Wis.; died August 28.

McCutchan, James F., Tulsa, Okla.; Keokuk Dental College, 1904; died August 8; aged 68.

McDonald, William F., Mt. Pleasant, Mich.; College of Dental Surgery, University of Michigan, 1905; died July 23; aged 73.

McFarland, Gail H., Los Angeles; died February 10.

McFarlane, William A., Waukesha, Wis.; Dental Department, Milwaukee Medical College, 1902; died April 2; aged 70.

McGarry, Susie, Cincinnati; died August 28; aged 69.

McKenna, Paul J., Springfield, Mass.; Tufts College Dental School, 1918; died August 31; aged 55.

McKenney, Mabene S., Morgantown, Ky.; School of Dentistry, Vanderbilt University, 1914; died July 9; aged 57.

McKeon, John F., Taunton, Mass.; Tufts College Dental School, 1904; died February 23; aged 78.

MacDonnell, William L., Utica, N. Y.; School of Dentistry, University of Pennsylvania, 1917; died August 24; aged 57.

Maile, John V., Los Angeles; College of Dentistry, University of Southern California, 1910; died September 2; aged 65.

Malcolm, James A., Oyster Bay, N. Y.; New York College of Dentistry, 1901; died June 11; aged 76.

Malkinson, Jack W., West Hartford, Conn.; Baltimore College of Dental Surgery of the University of Maryland, 1921; died June 29.

Mallinckrodt, Paul L., St. Charles, Mo.; School of Dentistry, St. Louis University, 1918; died July 8; aged 56.

Maloney, John C., Quincy, Ill.; Baltimore College of Dental Surgery, 1891; died May 24; aged 85.

Marley, Anthony J., Shaker Heights, Ohio; died July 13; aged 59.

Martin, Harry G., Los Angeles; College of Physicians and Surgeons, 1906; died June 20; aged 71.

Martin, William J., Edison, Ga.; Atlanta Dental College, 1913; died August 21.

Martinez, Joseph P., New Orleans; Atlanta Dental College, 1913; died July 2; aged 57.

Martmer, William B., Detroit; Department of Dental Surgery, Detroit College of Medicine, 1897; died June 26; aged 74.

Mason, H. Albert, Detroit; Department of Dental Surgery, Detroit College of Medicine, 1903; died May 28.

Matthews, Charles A., Conneautville, Pa.; Baltimore College of Dental Surgery of the University of Maryland, 1894; died February 7; aged 77.

May, William A., Utica, N. Y.; died June 18.

Meeks, Daniel H., Los Angeles; died August 3; aged 69.

Meis, H. J., Sheldon, Iowa; College of Dentistry, University of Iowa, 1898; died May 15; aged 73.

Menken, Irwin, New York; died March 22.

Merkley, Henry S., St. Petersburg, Fla.; School of Dentistry, University of Buffalo, 1897; died June 4; aged 73.

Meyers, Harry J., Danville, Pa.; School of Dentistry, University of Pittsburgh, 1926; died July 8; aged 44.

Mickelson, Antone O., Portland, Ore.; died July 29; aged 58.

Miller, Jacob, Philadelphia; Philadelphia Dental College, 1917; died July 8; aged 55.

Mills, Charles W., Chillicothe, Ohio; Ohio College of Dental Surgery, University of Cincinnati, 1892; died March 23; aged 75.

Mimmack, Alfred E., Buffalo; School of Dentistry, University of Buffalo, 1895; died July 15.

Miner, Kenneth W., Minneapolis; Chicago College of Dental Surgery, 1909; died August 2; aged 64.

Morton, Charles D., Greenfield, Ind.; Indiana Dental College, 1921; died August 9; aged 48.

Mosley, K. J., White Hall, Ill.; Chicago College of Dental Surgery, 1926; died July 14; aged 44.

Moss, Harry M., New York; New York College of Dentistry, 1911; died September 8; aged 58.

Mowel, Abram V., St. Petersburg, Fla.; School of Dentistry and the Baltimore College of Dental Surgery, University of Maryland, 1897; died April 2; aged 83.

Nelch, Harry G., Seattle; Chicago College of Dental Surgery, 1905; died August 9; aged 69.

Newton, William F., Kansas City, Mo.; Kansas City Dental College, 1919; died September 2; aged 64.

Nichols, James H., Rock Island, Ill.; Western Dental College, 1904; died July 6; aged 71.

Nixon, Clinton A., Valparaiso, Ind.; Chicago College of Dental Surgery, Dental Department of Loyola University, 1902; died April 13; aged 73.

Nye, Albert, Des Moines, Iowa; Omaha Dental College, 1898; died August 10; aged 78.

O'Hearn, Edward L., Medford, Mass.; Dental School, Harvard University, 1921; died July 5; aged 50.

Ortmann, Gustav A., Newark, N. J.; Philadelphia Dental College, 1901; died August 11.

Outland, G. Hollis, Cincinnati; Ohio College of Dental Surgery, University of Cincinnati, 1918; died June 29; aged 53.

Outten, Luther T., Silvis, Ill.; Chicago College of Dental Surgery, Dental Department of Loyola University, 1903; died March 24; aged 67.

Overmyer, Eugene E., Muskogee, Okla.; Indiana Dental College, 1902; died May 19; aged 70.

Overpack, Warren G., Los Angeles; College of Physicians and Surgeons, 1918; died in September; aged 62.

Parker, Barrett S., Oakland, Calif.; died July 4; aged 46.

Pendrey, J. W., La Belle, Fla.; Southern Dental College, 1903; died March 18.

Perkins, James F., Nashville, Tenn.; Dental Department, Meharry Medical College, 1926; died May 25; aged 52.

Peterson, Arthur C., Peoria, Ill.; Chicago College of Dental Surgery, Dental Department of Loyola University, 1921; died September 9; aged 68.

Pfister, Joseph A., Chicago; Chicago College of Dental Surgery, 1914; died July 10; aged 65.

Phillips, C. E., Shillington, Pa.; School of Dentistry, Temple University, 1917; died July 25.

Poer, Norman C., Atlanta, Ga.; School of Dentistry, University of Pennsylvania, 1903; died July 10.

Pollard, Harry G., West Winfield, N. Y.; Department of Dentistry, Medico-Chirurgical College of Philadelphia, 1909; died July 18; aged 60.

Popp, Arnolf, St. Louis; Marion-Sims Dental College, 1905; died July 8; aged 67.

Post, Orne C., Buckhannon, W. Va.; Baltimore College of Dental Surgery, 1906; died August 24; aged 64.

Quinn, J. Henry, Pryor, Okla.; Western Dental College, 1907; died July 16.

Ragan, F. J., Hartford, Conn.; Dental Department, Baltimore Medical College, 1912; died September 10.

Randall, Earl, River Forest, Ill.; Dental School, Northwestern University, 1915; died June 29; aged 61.

Remington, Alton D., Seattle; School of Dentistry, North Pacific College of Oregon, 1905; died July 22.

Reuter, Peter A., Milwaukee; Dental Department, Milwaukee Medical College, 1899; died September 17; aged 83.

Rice, C. M., Spencer, Ind.; Schoool of Dentistry, St. Louis University, 1908; died July 25; aged 70.

Richards, Jr., Calvin W., Salt Lake City; The Thomas W. Evans Museum and Dental Institute School of Dentistry, University of Pennsylvania, 1908; died August 31; aged 74.

Rileigh, George S., Arlington, Mass.; died July 14; aged 44.

Robinson, Wilfred H., Oakland, Calif.; College of Physicians and Surgeons, 1908; died September 12; aged 66.

Rothstein, Jacob, Jamaica Plain, Mass.; died September 10; aged 64.

Ruggles, Roland F., Braintree, Mass.; Tufts College Dental School, 1921; died August 23.

Sabin, Floyd B., Ladysmith, Wis.; Dental School, Marquette University, 1923; died September 18; aged 49.

Saghirian, Jivani H., Sr., Bergenfield, N. J.; The New York College of Dentistry, 1898; died August 26; aged 75.

Sandblom, John N., Stockholm, Sweden; died July 24; aged 77.

Saunderson, F. A., Grand Forks, N. D.; died August 28; aged 83.

Schildge, Fred W., Brooklyn; College of Dental and Oral Surgery, 1896; died July 16; aged 72.

Schrader, Otto H., Gas City, Ind.; Indiana Dental College, 1913; died September 2; aged 57.

Schramm, Walter C., Petaluma, Calif.; College of Dentistry, University of California, 1915; died June 9; aged 66.

Scranton, H. S., Florence, Colo.; Dental School, Northwestern University, 1907; died July 6; aged 64.

Seides, Harry M., New York; New York College of Dentistry, 1919; died July 18; aged 50.

Semans, Harry M., Colorado Springs, Colo.; New York College of Dentistry, 1897; died July 29; aged 80.

Seyfarth, Gotthardt E., Brooklyn; College of Dental and Oral Surgery, 1907; died July 9; aged 62.

Shealy, Perry H., Lexington, S. C.; Atlanta Dental College, 1903; died August 10; aged 71.

Shockney, Earl V. H., Arcadia, Ind.; Indiana Dental College, 1902; died September 2; aged 70.

Shonkwiler, A. R., Rockville, Ind.; School of Dentistry, Indiana University, 1905; died July 15; aged 66.

Slessman, B. F., Columbia City, Ind.; died June 26.

Smith, Claude B., Geneva, N. Y.; College of Dental Surgery, University of Michigan, 1907; died August 27; aged 65.

Smock, Grant H., Erie, Pa.; Northwestern College of Dental Surgery, 1901; died July 2; aged 73.

Snoeyenbos, Thomas, Milwaukee; Dental School, Marquette University, 1946; died July 26; aged 27.

Snyder, John W., Harrisburg, Pa.; School of Dentistry, Temple University, 1917; died August 22; aged 60.

Solomon, Aaron M., New York; College of Dental and Oral Surgery, 1917; died September 8; aged 56.

Solt, Harry W., Bethlehem, Pa.; Philadelphia Dental College, 1900; died August 21.

Southwell, Charles, Milwaukee; The Thomas W. Evans Museum and Dental Institute School of Dentistry, University of Pennsylvania, 1881; died July 3; aged 88.

Spriggs, Charles J., New York; School of Dentistry, University of Pennsylvania, 1905; died August 27; aged 64.

Spurlin, R. P., Berryville, Ark.; School of Dentistry, University of Louisville, 1902; died June 22; aged 69.

Srygley, Paul D., Nashville, Tenn.; School of Dentistry, Vanderbilt University, 1919; died July 28; aged 52.

Stamm, Harry M., St. Louis; School of Dentistry, St. Louis University, 1913; died July 2.

Stark, D. C., California, Mo.; died August 18; aged 73.

Stevens, Francis J., Suring, Wis.; Dental School, Marquette University, 1923; died August 3; aged 50.

Stoddard, Fred, Loveland, Colo.; School of Dentistry, University of Pennsylvania, 1910; died August 13; aged 60.

Stokes, Samuel H., Haverill, Mass.; Tufts College Dental School, 1918; died July 23; aged 52.

Stromberg, Norvin, Milwaukee; Dental School, Northwestern University, 1915; died September 6; aged 54.

Sullivan, Clarence P., Fall River, Mass.; School of Dentistry, Temple University, 1917; died August 17.

Swisher, Arthur R., Iowa City; died June 23; aged 74.

Taylor, Everett, Willimantic, Conn.; died September 1.

Thompson, James C., Lancaster, Pa.; School of Dentistry, University of Pennsylvania, 1924; died June 20.

Towers, Otto J., Circleville, Ohio; Ohio College of Dental Surgery, University of Cincinnati, 1905; died July 23; aged 69.

Tripp, Ernest A., Salt Lake City; Philadelphia Dental College, 1887; died August 7; aged 85.

Turnbull, James R., Santa Monica, Calif.; College of Dentistry, University of Southern California, 1941; died July 4; aged 33.

Vogel, John A., Milwaukee; died August 2; aged 69.

Walsh, Thomas F., Elizabeth, N. J.; New York College of Dentistry, 1898; died August 2; aged 72.

Wampler, Joseph K., Edgewood, Pa.; School of Dentistry, University of Pittsburgh, 1922; died August 9; aged 50.

Webb, Edward R., Syracuse, N. Y.; died June 28.

Weinberger, Joseph J., Passaic, N. J.; died July 21; aged 75.

Weis, William A., St. Louis; Dental Department, Marion-Sims College of Medicine, 1899; died June 21; aged 73.

Weisbord, I., Clifton Heights, Pa.; School of Dentistry, Temple University, 1934; died June 6.

West, Reuben M., Washington, D. C.; College of Dentistry, Howard University, 1915; died in August; aged 62.

Whalen, Ambrose A., Washington, D. C.; died in July.

Wilson, Kenneth M., Peoria, Ill.; School of Dentistry, St. Louis University, 1921; died February 29; aged 49.

Wilson, Walter L., Wichita, Kan.; Dental School, Northwestern University, 1910; died May 22; aged 62.

Winter, Leo, New York; New York College of Dentistry, 1914; died July 6; aged 58.

Wittkopp, Harry S., San Francisco; College of Physicians and Surgeons, 1920; died March 24; aged 52.

Woehler, W. W., Anaconda, Mont.; College of Dentistry, University of Minnesota, 1901; died August 12; aged 75.

Wohrna, J. W., Baltimore; Baltimore College of Dental Surgery, 1914; died May 11.

Zinn, Philip, Bayside, N. Y.; School of Dental Oral Surgery, Columbia University, 1924; died July 31; aged 49.

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222 East Superior Street, Chicago 11, Illinois
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State	Date	Place	Secretary	Address
Alabama	May 2-4, 1949	Biloxi	G. W. Matthews	1922 Tenth Ave., S., Birmingham 5
Arizona			H. G. DeWolf	Valley National Bank Bldg. Tucson
Arkansas			D. M. Hamm	Clarksville
California			L. E. Linehan	450 Sutter St., San Francisco
S. California	April 4-6, 1949	Los Angeles	M. E. Ralston	903 Crenshaw Bldg., Los Angeles 6
Colorado	May 25-27, 1949	Colorado Springs	R. A. Downs	724 Republic Bldg., Denver 2
Connecticut			E. S. Arnold	37 Linnard Rd., W. Hartford
Delaware			G. Zurkow	301 Medical Arts Bldg., Wilmington 9
D. of Columbia			K. H. Wood	202-1835 Eye St., N. W., Washington
Florida	Dec. 12-15	Hollywood	J. I. Todd	433 St. James Bldg., Jacksonville
Georgia			J. M. Heard, Jr.	Persons Bldg., Macon
Hawaii			J. H. Dawe	P. O. Box 39, Honolulu 10
Idaho			H. R. Packard	Idaho Falls
Illinois	May 9-12, 1949	Peoria	P. W. Clopper	623 Jefferson Bldg., Peoria 2
Indiana	May 16-18, 1949	Indianapolis	E. E. Ewbank	Kingman
Iowa	May 2-4, 1949	Des Moines	H. I. Wilson	Insurance Exchange, Des Moines
Kansas			F. A. Richmond	1008 Huron Bldg., Kansas City
Kentucky	April 3-6, 1949	Louisville	A. B. Coxwell	1976 Douglass Blvd., Louisville
Louisiana	June 1-4, 1949	New Orleans	J. S. Bernhard	407 Medical Arts Bldg., Shreveport
Maine			P. W. Anderson	32 Deering St., Portland 3
Maryland			E. L. Passagno, Jr.	415 Medical Arts Bldg., Baltimore 1
Massachusetts	May 2-5, 1949	Boston	P. E. Adams	227 Commonwealth Ave., Boston 16
Michigan	April 11-13, 1949	Detroit	F. Wertheimer	Michigan Department of Health, Lansing
Minnesota	Feb. 21-23, 1949	Minneapolis	C. V. E. Cassel	Lowry Medical Arts Bldg., St. Paul
Mississippi	April 10-13, 1949	Vicksburg	F. C. Sneed	Oayka
Missouri	April 10-13, 1949	St. Louis	C. W. Digges	Exchange National Bank Bldg., Columbia
Montana	May 5-7, 1949	Bozeman	C. S. Renouard	305 Phoenix Bldg., Butte
Nebraska	May 9-11, 1949	Lincoln	F. A. Pierson	Federal Securities Bldg., Lincoln
Nevada	June 3-4, 1949	Reno	L. G. Jacob	505 Chestnut St., Reno
New Hampshire			F. E. Williams	814 Elm St., Manchester
New Jersey	April 27-29, 1949	Atlantic City	J. G. Carr	407 Copper St., Camden
New Mexico			J. S. Ellar	First National Bank Bldg., Albuquerque
New York	May 10-13, 1949	Buffalo	C. A. Wilkie	1 Hanson Place, Brooklyn
North Carolina	May 19-21, 1949	Pinehurst	R. F. Hunt	Rocky Mount
North Dakota	May 8-11, 1949	Bismarck	A. L. Smeby	Northwood
Ohio			E. G. Jones	185 E. State St., Columbus
Oklahoma	April 10-13, 1949	Oklahoma City	F. H. Binkley	Hennessey
Oregon	Feb. 28-Mar. 2, 1949	Portland	W. H. Hurley	722 Selling Bldg., Portland 5
Panama Canal Zone			R. O. Leon	Box 1094, Ancon
Pennsylvania			E. R. Aston	421 Market St., Kingston
Puerto Rico	Jan. 13-16, 1949	San Juan	E. Capo	9 Villa St., Ponce
Rhode Island			A. A. Albert	84 Broad St., Pawtucket
South Carolina	May 1-3, 1949	Myrtle Beach	J. R. Owings	201 E. North St., Greenville
South Dakota	May 15-17, 1949	Aberdeen	E. W. Elmen	Sioux Falls
Tennessee	May 16-19, 1949	Knoxville	E. J. Justis	Exchange Bldg., Memphis
Texas	May 2-5, 1949	Houston	W. Ogle	313 Medical Arts Bldg., Dallas
Utah			H. R. Nordberg	807 Tribune-Telegram Bldg., Salt Lake City
Vermont	May 22-24, 1949	Woodstock	J. A. Larrow	Middlebury
Virginia	April 11-13, 1949	Roanoke	J. E. John	804 Medical Arts Bldg., Roanoke
Washington	June 21-23, 1949	Seattle	F. J. Dingler	1502 Medical-Dental Bldg., Seattle 1
West Virginia	May 19-21, 1949	Wheeling	C. J. Gavelda	Clarksburg
Wisconsin	April 19-21, 1949	Milwaukee	R. A. Mason	964 N. 27th St., Milwaukee 2
Wyoming			T. A. Ward	Casper

MEETINGS OF STATE BOARDS OF DENTAL EXAMINERS

State	Date	Place	Secretary	Address
California	Feb. 7, 1949 June 13, 1949 July 25, 1949	San Francisco Los Angeles San Francisco	K. I. Nesbitt	Room 307, 507 Polk Street, San Francisco 2
D. of Columbia	Jan. 10-14, 1949	Washington	D. S. Thorn	1726 Eye St., N. W., Washington
Michigan	Feb. 7-12, 1949 May 23-28, 1949	Ann Arbor Ann Arbor	J. L. Champagne	502 David Whitney Bldg., Detroit 26
Minnesota	Jan. 3-8, 1949	Minneapolis	E. E. Comartin	334-100 First Avenue Bldg., Rochester
Mississippi	Jan. 11, 1949	Jackson	J. C. Boswell	508 Lamar Life Bldg., Jackson
New Jersey	Nov. 29-Dec. 3 June 6-10, 1949		W. A. Wilson	150 E. State St., Trenton
Oregon	Dec. 6-9	Portland	F. L. Utter	506 Pioneer Trust Bldg., Salem
Pennsylvania	Dec. 6-11	Philadelphia	R. E. V. Miller	Northampton National Bank Bldg., Easton
Tennessee	Dec. 13-17	Memphis	J. J. Vaughn	1005-6 Medical Arts Bldg., Nashville 3
West Virginia	June 27-29, 1949	West Liberty	R. H. Davis	510-16 Goff Bldg., Clarksburg
Wisconsin	Feb. 7-11, 1949	Milwaukee	S. F. Donovan	Tomah

OTHER MEETINGS

Name	Date	City	Secy. or Chm.	Address
Academy of Denture Prosthetics	June 13-18, 1949	Indianapolis	I. L. Furnas Secy.	928 Silverado St., La Jolla, Calif.
American Academy of Dental Medicine	Dec. 5	Pennsylvania	W. M. Greenhut Secy.	124 East 84th St., New York 28
American Board of Orthodontics	April 28-May 1, 1949	New York	S. C. Hopkins Secy.	1726 Eye St., N. W., Washington 6, D. C.
Chicago Dental Society, Mid-Winter Meeting	Feb. 7-10, 1949	Chicago	A. L. Brett Secy.	30 N. Michigan Ave., Chicago
Denver Dental Association, Forty-Second Annual Mid-Winter Meeting	Jan. 9-12, 1949	Denver	H. A. Neuman Secy.	724 Republic Bldg., Denver
District of Columbia, Annual Postgraduate Clinic	Mar. 13-16, 1949	Washington	S. G. Mead Secy.	1149 16th St., N. W., Washington
Federacao Odontologica Brasileira, Fourth Congresso	July, 1949	Recife, Brazil	R. Ewerton	277 Avenida Rio Branco, Rio de Janeiro
Greater New York Dental Meeting, Twenty-Fourth Annual Meeting	Dec. 6-10	New York	Mabel Purdy Secy.	Rm. 106A, Hotel Pennsylvania, New York 1
Greater Philadelphia Annual Meeting	Feb. 2-4, 1949	Philadelphia	R. Adams Secy.	501 Stock Exchange Bldg., Philadelphia 2
National Board of Dental Examiners	Dec. 6-7*		G. L. Teall Secy.	Box 71, Hiawatha, Kan.
Pan American Odontological Association, Twelfth Annual Dinner Meeting	Dec. 8	New York	R. H. Brodsky Exec. Secy.	14 E. 81st St., New York
Seventh Pacific Science Congress	Feb. 2-8, 1949 Feb. 16-22, 1949	Auckland, N. Z. Christchurch, N. Z.	G. Archey Secy.	Seventh Pacific Science Cong., Auckland Institute & Museum, Box 27, Newmarket, Auckland, S. E. 1, New Zealand
Thomas P. Hinman Mid-Winter Clinic, Thirty-Sixth Annual Meeting	Mar. 20-23, 1949	Atlanta	J. A. Broach Chm.	1105 Doctors Bldg., Atlanta, Ga.
University of Kansas City, School of Dentistry, Kansas City-Western Dental College, Alumni Association, Annual Dinner	Mar. 21-22, 1949	Kansas City	C. W. Sawyer Secy.	1108 E. Tenth St., Kansas City 6

*Examinations will be held in schools where there are five or more candidates.

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Undercuts and Overgrowth of Tissue

Undercuts and overgrowth of tissue are often sou
of denture trouble.[1] Large tuberosities may mak
difficult to take a proper impression; and the pro
nent points of undercuts on the ridges are apt to
bruised by the denture.[37] Surgical removal of the b
part may be unavoidable in some cases, but Mill
believes that conservative management will be s
cessful in many others.

Creeping, overgrowing tissues—unless surgic
corrected—will require compensating reliefs in t
denture structure to protect folds, ridges and soft p
from undue pressure... In the conservative mana
ment of undercuts and/or overgrowth of tissue, re
may be heightened, a better peripheral seal assu
and denture efficiency materially improved, by t
temporary use of Wernet's Powder.

Cross-section of undercut.

10

COUNCIL ON DENTAL THERAPEUTICS
AMERICAN DENTAL ASSOCIATION

WERNET

To be protected against pressure, OVERGROWTHS require reliefs in the denture.

11

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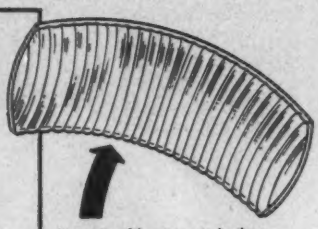

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Justi-facts

#75

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MUCO-SEAL | Fluorescent ACRYNAMEL, STAINS and ACCESSORIES

533. *There is little logic in—*

a) matching a natural tooth with a porcelain shade guide; then
b) matching the porcelain shade guide to an acrylic tooth (even if they are the same number); and then
c) expecting the acrylic tooth to match the natural tooth.

534. *Use the Denta Pearl shade guide to match the natural tooth directly—there is a reason.*

535. *Denta Pearl shade guides are made—*

a) of the same shaded powders,
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c) by the same method, and at the same time . . . as Denta Pearl teeth—thus you have a direct match—not an approximation.

536. *Incidentally—don't [illegible] of hardness of acrylic teeth based on a [illegible] or other "kitchen sink" methods of t[illegible]*

537. *Denta P[illegible] of Rockwe[illegible] M 104[illegible]*

Columbia Rubber MODEL FORMERS

Make Neat Bases on Your Study Models

POUR plaster or stone into Model Former, mount anatomical cast and let set. The soft flexible rubber permits easy removal of model, which comes out with a perfectly smooth, symmetrical and finished base.

Upper and lower models can be made in these formers to occlude automatically!

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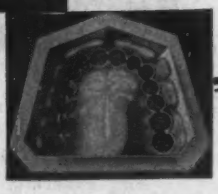
Study models show patients their mouths as you see them. Make study models regularly. You need them as you do X-Rays.

MAKE Demonstration MODELS from SURPLUS PLASTER

with COLUMBIA RUBBER DENTOFORM MOLDS



Better than sketches to explain cases to patients

Instead of wasting surplus plaster pour it into the Mold. If not enough, add the next excess mix, first wetting the set plaster. To make Models with Ivorine abutments, insert Ivorine Teeth into Mold before pouring.

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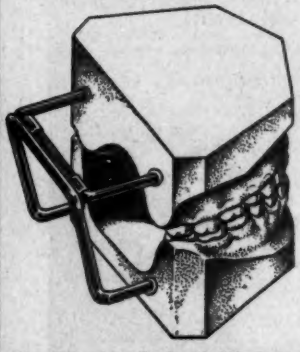
Ivorine Teeth, each..... .50

ARTICULATE



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These articulators can be used repeatedly.

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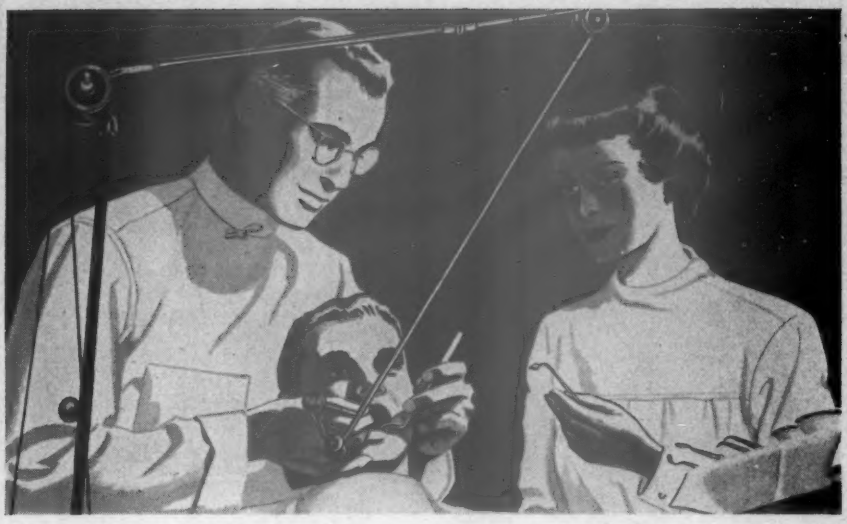

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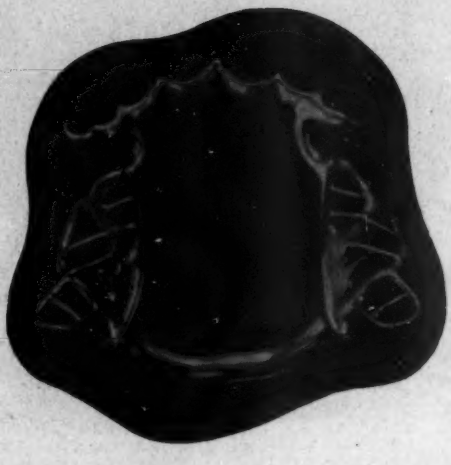

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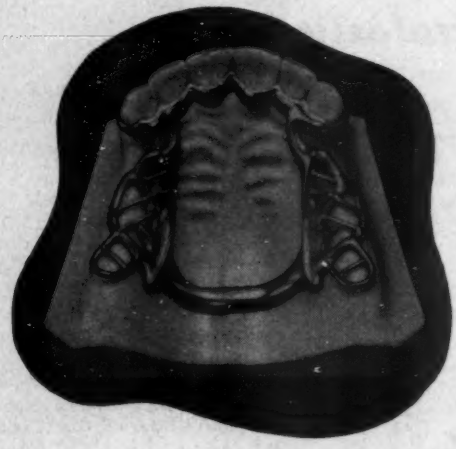

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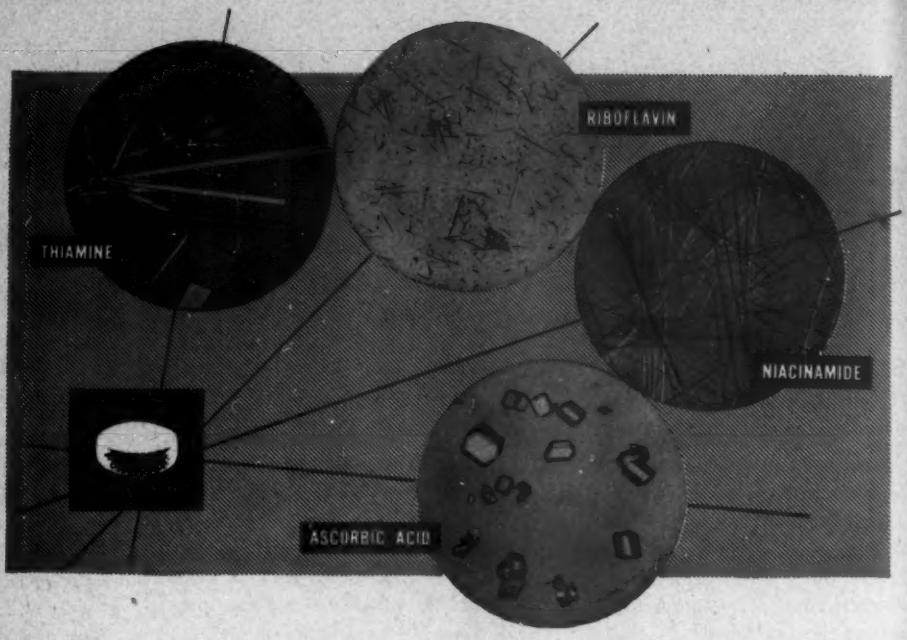

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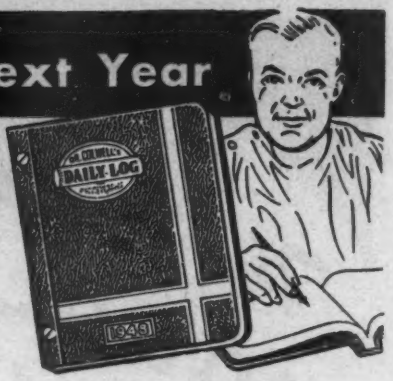

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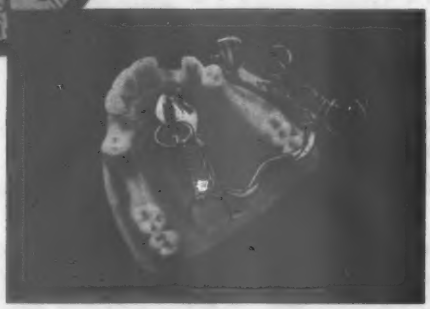

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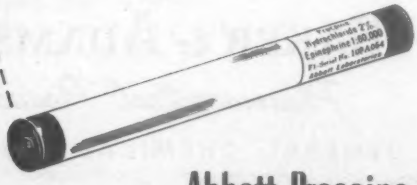

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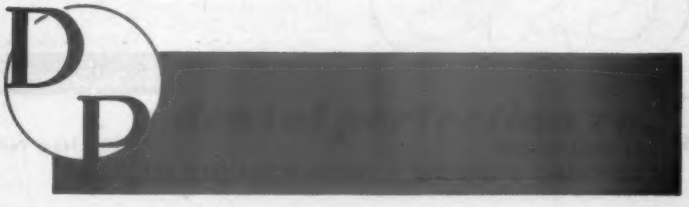

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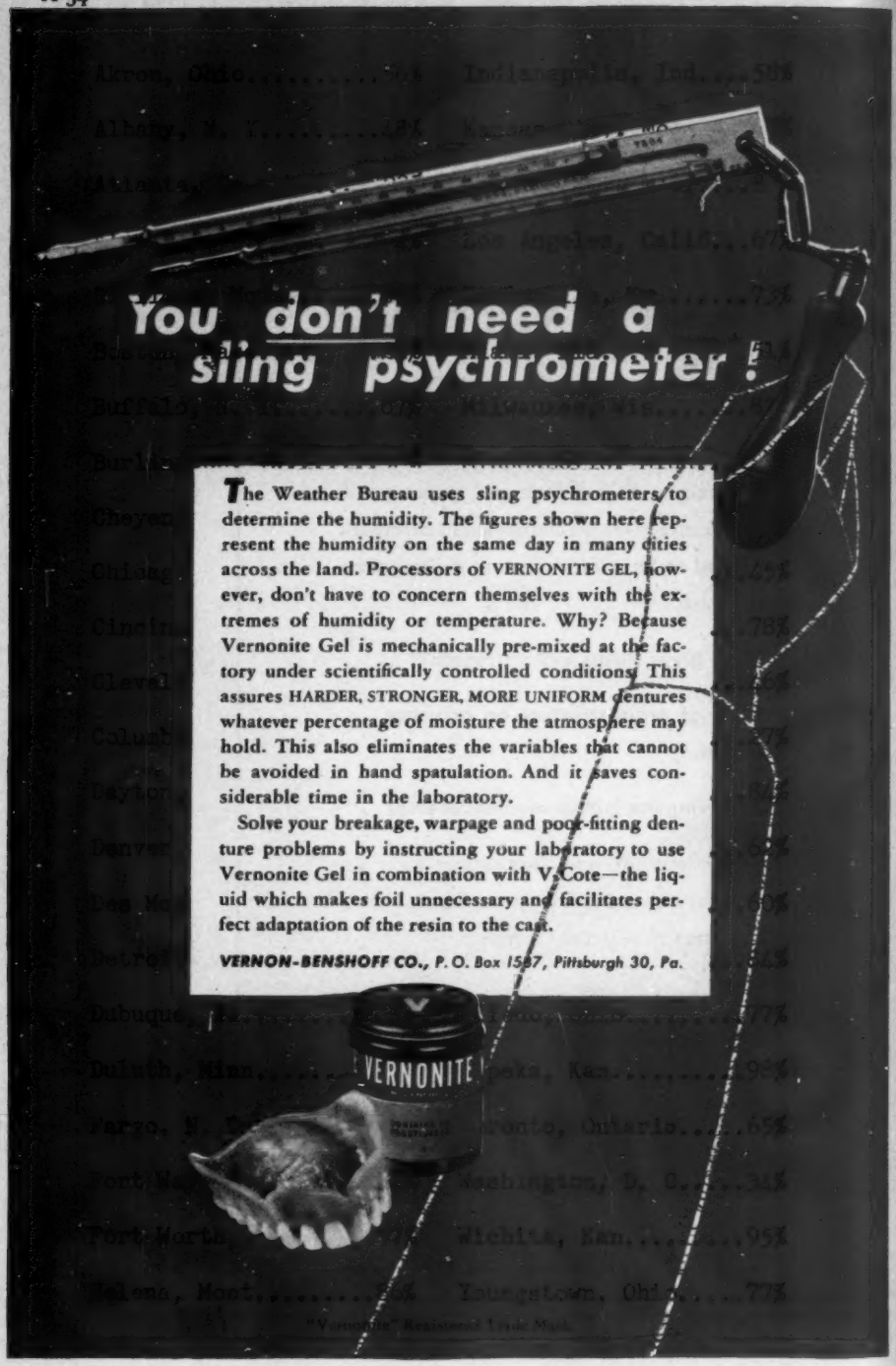
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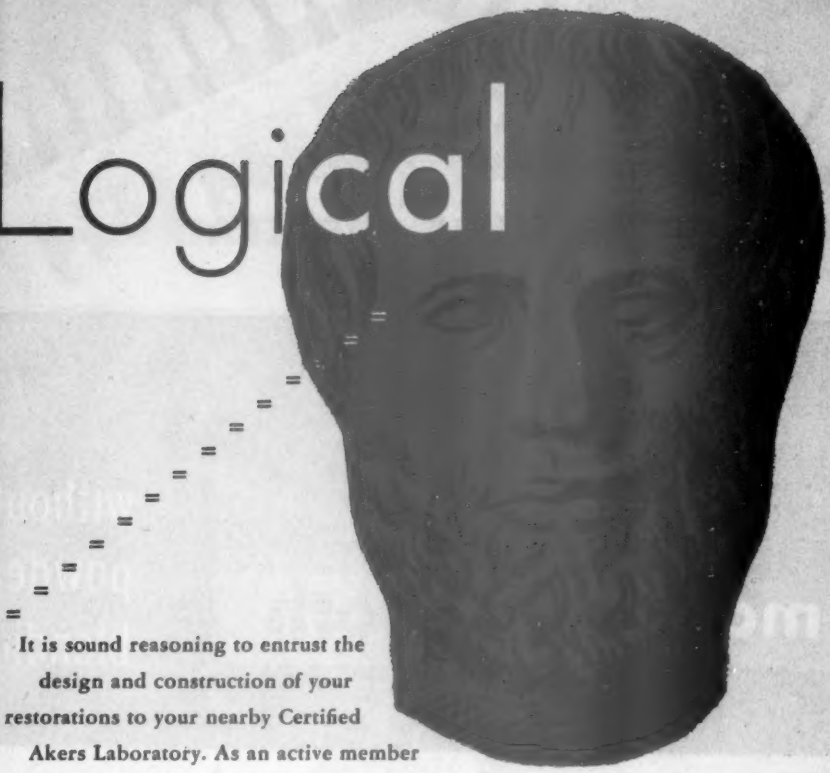

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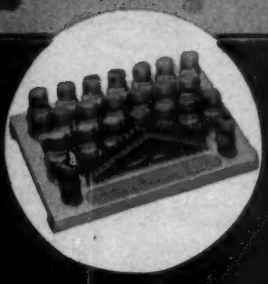

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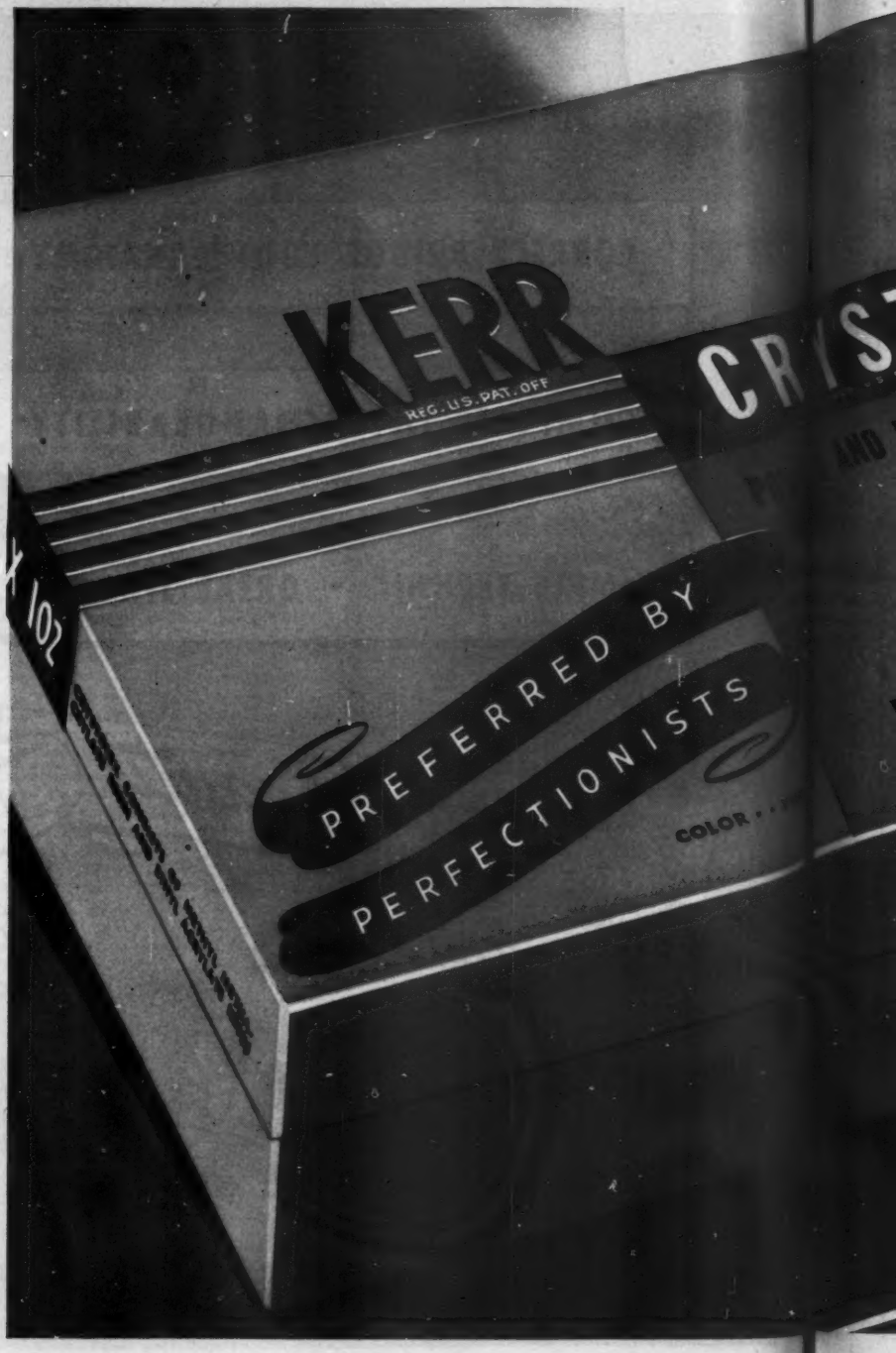
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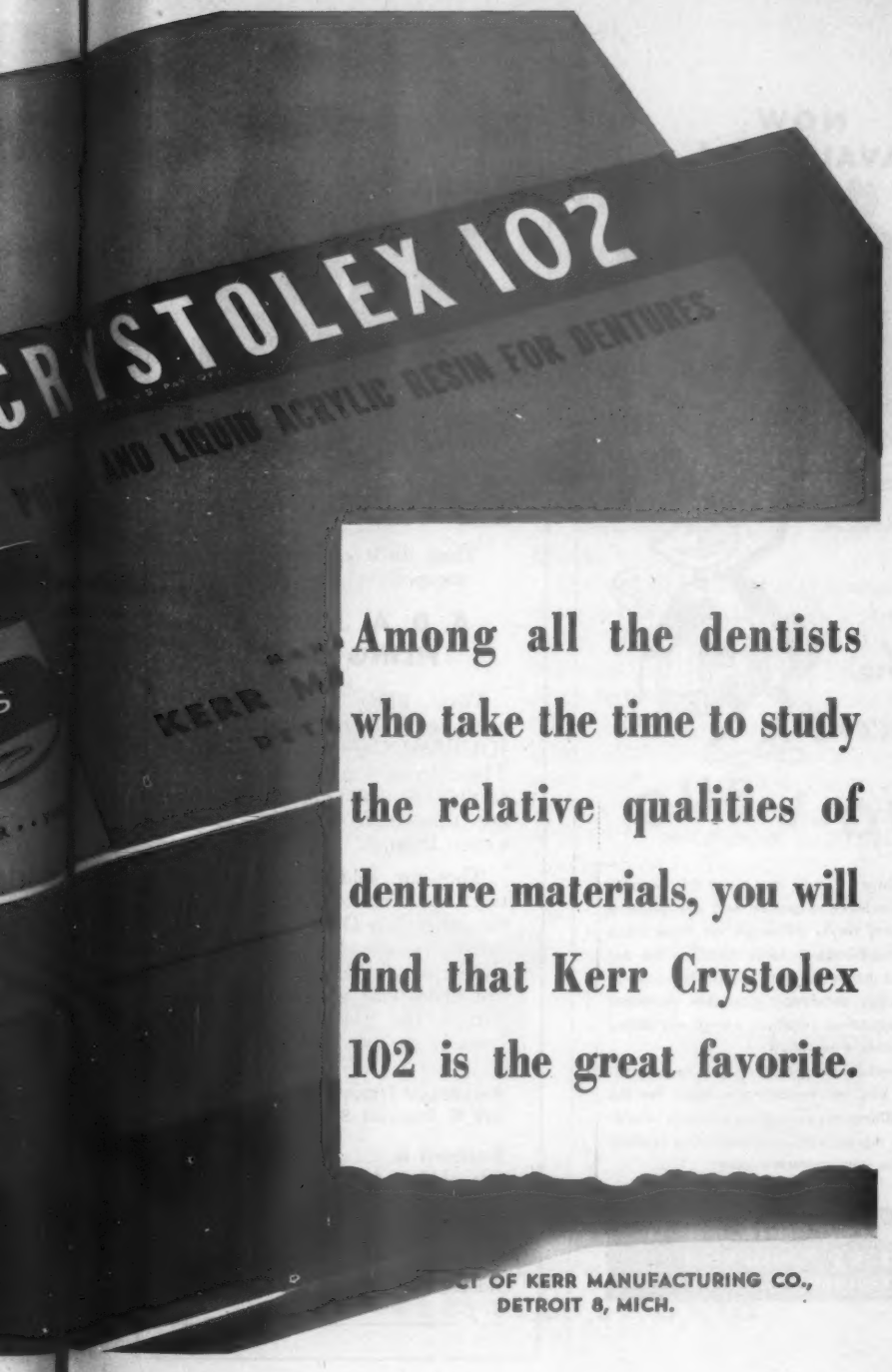

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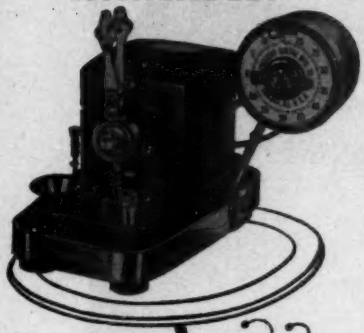

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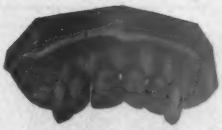


Fig. 1

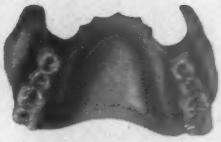


Fig. 2

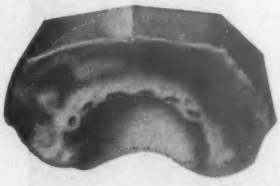
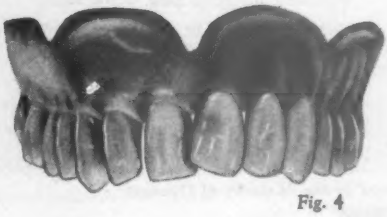


Fig. 3



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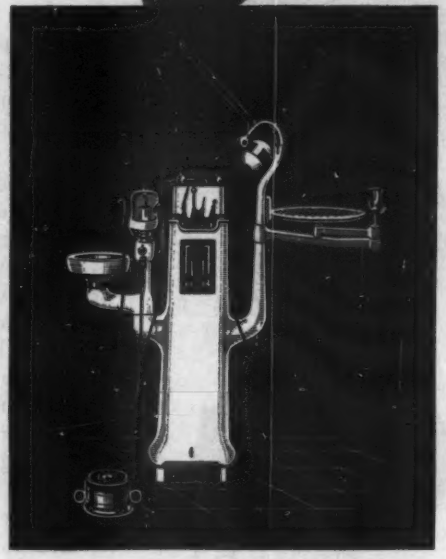

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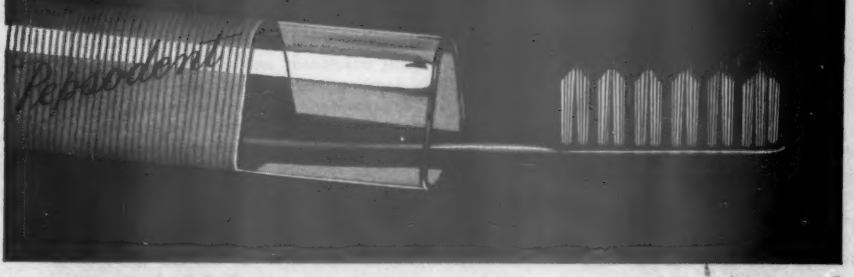

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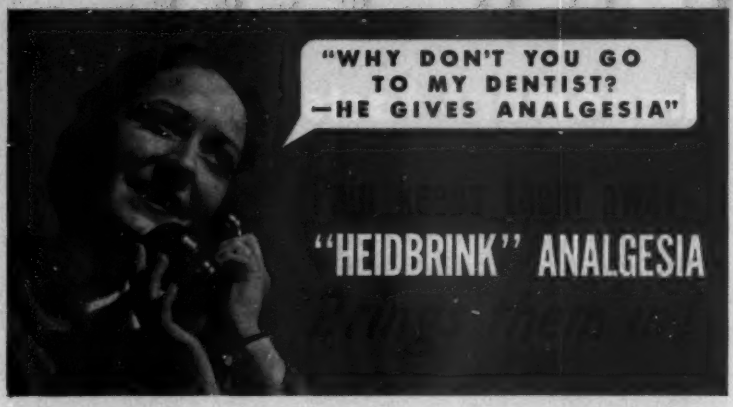

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Milk, nature's most nearly perfect food, gives you more for your money than anything else you can eat. We make sure that milk—and cheese, butter, ice cream, and other products made from milk—are nourishing, flavorful, and pure. And we see to it that these fine foods ***reach the largest possible number of people, at the lowest possible prices.***

An impartial national survey shows that most Americans consider 10%-15% on sales a fair profit for business. Compared to this, the average profit in the food industry is less than 5%. And National Dairy's profit in its milk divisions in 1947 was less than 2%.

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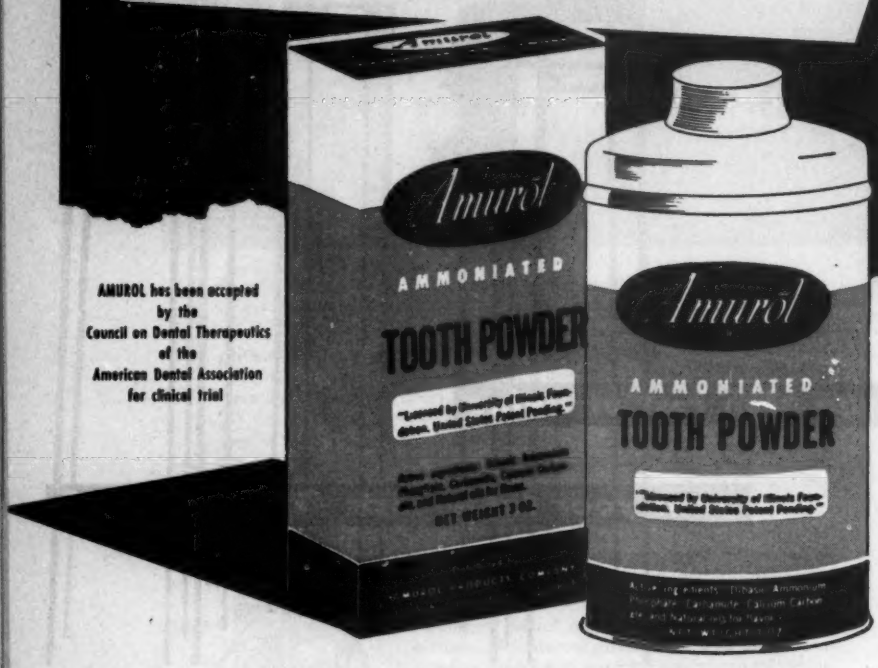
a new milestone

IN MODERN DENTISTRY



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AMUROL marks another milestone in the progress of modern dentistry and a new era in the preventive technique. Developed by the University of Illinois, one of the great dental institutions of the country, AMUROL is the result of extensive research by eminent authorities. Because AMUROL has actual controlled clinical evidence to prove its worth, you may recommend it to all your patients with full confidence. It is non-toxic and non-irritating and so may be used by young and old with excellent results.

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TWO NEW LEAFLETS

G-10 ***Attractive Teeth for Young Men and Women*** for distribution in Y.M.C.A., Y.W.C.A. and industry. Excellent for reception room table.

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We're convinced that more dentists should know and use three Buffalo Dental items essential to tooth prophylaxis. So we've combined them in one economical PROPHY PACKAGE containing:

1 Full size jar Buffalo Dental Prophylaxis Paste (10 oz.)	regular price	$1.25
3 Doz. Robinson's Bristle Dics, assorted types	regular price	3.00
1 Buffalo Dental Opal Glass Prophylaxis Dish. (has depression in bottom for use with medicaments)	regular price	.50
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Grinding a good alloy into dust will never produce anything like Aristaloy which, like our present filling porcelain, was developed through facing facts with years of research.

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H.J.Russell

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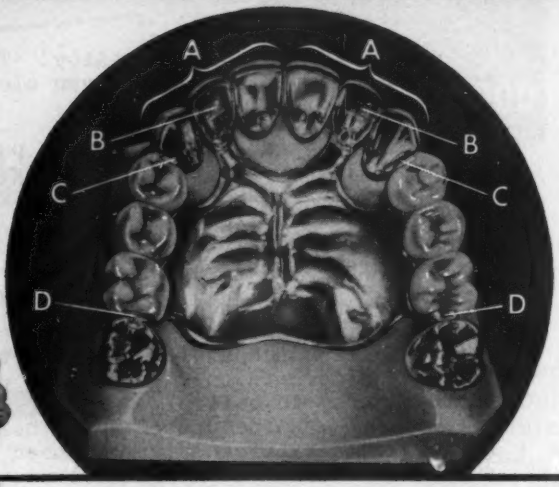
TECHNICAL BULLETIN NO. 5
TYPICAL PRECISION ATTACHMENT PARTIAL DENTURES
CASE E

THE PROBLEM



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FOR SALE—Practice in one of the wealthiest suburban communities. Ideal opportunity for a high grade Jewish dentist who is capable of good prosthetic work. Practice long established and returning a good net income. Considerable cash required. Address Francis Clarke, Rm. 1518, 59 E. Madison, Chicago 2, Illinois.

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FOR SALE — To Close Estate — Fully equipped bungalow office with living quarters and garage. Fifty foot lot shopping center opposite theatre. Excellent neighborhood. $22,500. C. G. Lewis, 2543—22nd Avenue, San Francisco 16, Calif.

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FOR SALE—Highly desirable location for sale, Pasadena, Calif. Large dental practice established 21 years. Full equipment. Rent $68; lease. $4,000 includes everything. Address California Medical Bureau Agencies, 24 S. Los Robles, Pasadena, Calif.

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FOR SALE—Good location for dentist in conveniently situated small town with good surrounding territory in Piedmont section of North Carolina. For information contact or write J. F. Fulp, M.D., Stoneville, North Carolina.

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FOR SALE—Modern brick bungalow office—three chairs, three cabinets two x-rays, large prosthetic laboratory, technical laboratory, microscope, chemicals, etc., suitable for two operators, hygienist, technician. Established in present location for ten years. Will stay and introduce purchaser. Write for details. Dr. A. A. Lawry, 114 W. Moore Street, Valdosta, Georgia.

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FOR SALE—Excellent practice, well established. Busy transfer corner, Chicago, Illinois. Includes fully equipped two main operating rooms, private reception room, business office, laboratory and dark room. Will introduce purchaser and stay until he becomes fully acquainted with practice. Down payment of $8,500.00 required, balance on terms to be arrangeo. Address A.D.A. Dept. 5341.

FOR SALE—Dental practice in Arlington, Virginia due to illness. Chance of lifetime; fully equipped office; undoubtedly best opening and location in State. Adjacent to Washington. Write F. B. Bostivick, 3702 Valley Drive, Alexandria, Virginia.

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FOR SALE—Beautiful office—for sale or lease, all new equipment. Motor chair, x-ray, American cabinet, etc. Excellent buy or can be rented. Address Dr. Kahn, 1575 Beacon Street, Brookline, Mass.

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FOR SALE—Fully equipped office and furnished apartment in town near Pittsburgh. Population 3500, large outlying district. Excellent practice. No competition, low overhead, established 30 years. Good schools and shopping district. Office and apartment in Bank Building. All dentist has to do is come in and go to work. Leaving state due to ill health. Address A.D.A. Dept. 5342.

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FOR SALE—Seashore corner property—Ideally located for dental practice. Consisting of Waiting room, office, lavatory, dining room, kitchen, living room, two bedrooms, bath, sun-deck and garage; (oil heated) and in addition living room, dining room, kitchen, three bed-rooms and two baths for summer rental to supplement yearly income. Completely furnished. $18,-750.00—Can finance. Address T. J. Taylor, 54th and Blvd., Brant Beach, New Jersey.

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FOR SALE—Practice ideally located downtown White Plains, N. Y. Latest Ritter equipment, splendid furniture. Second operating room unequipped may be sublet. Long lease. Low rent. Will help introduce. Leaving for Public Health position. Address Dept. 5343.

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LOCATIONS AND PRACTICES AVAILABLE

FOR RENT—Suite in new modern medical dental clinic to be completed Jan. 1st. Building located across from only hospital in fast growing highly industrial and farming center with drawing population of 30,000. City has seven dentists three of whom will retire shortly. Competent young man can gross $20,000, first year. M.D. in building established in community with extensive medical and surgical practice. Location: 40 miles from San Francisco. Address A.D.A. Dept. 5347.

EQUIPMENT FOR SALE

FOR SALE—Ritter Dental X-ray, $150.00—Address Mrs. R. L. Beeghly, Kimball, South Dakota.

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FOR SALE—New, never used, Ritter wall type x-ray, Castle light, air compressor, D.C. Slightly used; S. S. White model K unit, American Cabinet, sterilizer, etc. Lakewood 4853.

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FOR SALE—Dental equipment (crated) Ritter tri-dent split unit, motor chair, cabinet, Weber X-ray, Castle light, sterilizer, Ivory tan. Air compressor, etc. Major D. B. McAllister, Station Hospital OAFB. Orlando, Florida.

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FOR SALE—Complete equipment for two chair office—Mahogany, two Harvard chairs, two American cabinets, one Clark unit, one Harvard unit, one sterilizer and cabinet, and one lab bench. $1,000. Address—Suite 1026, Gary National Bank Bldg., Gary, Indiana.

OPPORTUNITIES AVAILABLE

WANTED—Dentists under forty years of age for clinic staff in a well established medical prepayment plan. Dentistry is just now being added to complete the medical services of the plan. Emphasis will be placed in preventive care. Beginning salary $5,800 for General Practitioners, $7,000 for Specialists. Specialist must qualify for American Boards. Liberal schedule of salary increases. District of Columbia license required. For details write Melvin L. Dollar, Executive Director, Groupy Health Association, 1025 Vermont Avenue, Washington, D. C.

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OPPORTUNITY for good dentist at Livonia, New York, township of 2800, located 25 miles south of Rochester. Prosperous farming and resort community surrounding village. Former dentists have retired. Pleasant heated offices available. Complete good used equipment, including x-ray, may be purchased, if wanted. Address—John J. Carey, Attorney—Livonia, New York.

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OUTSTANDING opportunity for Ohio License office and practice, Cincinnati. Six chairs, complete equipment and x-ray. Annual gross over $50,000. Must give up practice account ill health. If interested write Address Dept. 5345.

SITUATIONS WANTED

YOUNG DENTIST—Desires association in general practice, Pa. or W. Va., with intent to buy in immediate future. Address A.D.A. Dept. 5346.

AGENCIES

The Medical Bureau has a great group of capable and well-trained dentists available for temporary and permanent appointments: many desire assistantships: others are specialists qualified to head departments. For biographies write Burneice Larson, Director, The Medical Bureau, Palmolive Building, Chicago, Ill.

OPPORTUNITIES AVAILABLE

(a) Dentists qualified for teaching appointments in the following departments: restorative dentistry (operative and crown and bridge work), oral medicine diagnosis, pathology and periodontology) and denture prosthesis (complete and partial); South.

•

(b) Young dentist experienced or trained in public health dentistry; regional consultant position; South.

•

(c) Dentist to join staff of dental clinic; forty-hour week; $5,200; opportunity for private practice; South.

•

(d) Dentist to become associated with small group well established in large Ohio city; salary or percentage, eventual partnership.

•

(e) Resident dentist; state hospital, Southeast; maintenance in apartment or house available, including meals, laundry, at a cost of $300 yearly per adult; $3,840-$4,646.

•

(f) Young dentist preferably with orthodontia experience to become associated with dentist practicing in the Canal Zone; capable operator required; unusual opportunity.

•

(g) Dentists qualified in teaching for positions in maxillofacial prosthesis, periodontics, dental medicine, dental and general pathology; university school of dentistry.

•

(h) Young dentist to become associated with dentist well established in Chicago; full time; salary or percentage.

•

(i) Dentist to join staff of small hospital in Southwest; considerable work among the Indians.

•

(j) Pediodontist to become associated with dentist and physician well established in the Pacific Northwest.

(k) Young dentist to assist in the general practice of dentistry; Northwestern graduate preferred; Chicago area.

•

(l) Dentist who has specialized in children's dentistry to become associated with dentist well established in fashionable winter resort town in Florida.

•

(m) Michigan-licensed dentist to become associated with small group; duties principally general practice; Detroit area.

•

(p) Dentist to become associated with dentist well established in South Carolina; advantageous if qualified in orthodontia; eventual partnership.

•

(s) Associate, private practice of dentistry; salary, then percentage; New Hampshire.

•

(t) Dentist to join group of physicians engaged in private practice; preferably one qualified to speak Spanish; Southern California.

•

(u) Dentist for institutional position; northern college town of 10,000.

•

(v) Dentist to work in the schools of fairly large town in West Virginia.

•

(w) Dentist licensed in Florida for public health appointment.

•

(x) Young dentist, qualified to teach class of young women in dental assisting; teaching would require part-time only, balance of time would assist prominent dentist in private practice; around $5,000; Massachusetts.

•

(z) Highly trained orthodontist to head department; group clinic; staff of thirty specialists; town of 60,000; Southwest.

•

For further information, please write Burneice Larson, Director, Medical Bureau, Palmolive Building, Chicago 11.

TECHNICAL ASSISTANTS

(a) Public health dental hygienist; public school system; university town; would have active support of very progressive dental society; West.
For further information, please write Burneice Larson, Medical Bureau, Palmolive Building, Chicago 11.

SITUATIONS WANTED

Public health dentist; B.S., D.D.S.; eastern schools; Master's degree in Public Health Dentistry recently received; available immediately; for further information, please write Burneice Larson, Medical Bureau, Palmolive Building, Chicago 11.

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Young dentist is available for position offering opportunity to engage in research; preferably cancer research; B.S. (Zoology); six years laboratory and teaching experience; D.D.S., eastern university dental school; for further information, please write Burneice Larson, Director, Medical Bureau, Palmolive Building, Chicago 11.

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Dentist; D.D.S., University of Minnesota; graduate training in oral medicine and periodontology; teaching experience; during military service held administrative appointment in dentistry; several years, head of department of periodontology, large institution and clinic; for further information, please write Burneice Larson, Director, Medical Bureau, Palmolive Building, Chicago 11.

•

Orthodontist; B.S., D.D.S., eastern schools; several years, successful practice of dentistry; post-graduate course (14 months) in orthodontics; past two years, private practice of orthodontics; for further information, please write Burneice Larson, Director, Medical Bueau, Palmolive Building, Chicago 11.

•

Young dentist who has specialized in children's dentistry seeks assistantship, clinic or industrial appointment; recent graduate; for further information, please write Burneice Larson, Director, Medical Bureau, Palmolive Building, Chicago 11.

•

Oral surgeon; B.S., D.D.S., M.S.D., (Oral Surgery), Middle Western university; following discharge from military service had several years' successful general practice of dentistry; during military career, assignments principally in dental surgery; recently completed graduate training in oral surgery for which he received Master's degree; for further information please write Burneice Larson, Director, Medical Bureau, Palmolive Building, Chicago 11.

•

Young dentist; D.D.S., Middle Western university; two years, post-graduate training in prosthetics for which he received M.S. degree in prosthetics; for further information, please write Burneice Larson, Director, Medical Bureau, Palmolive Building, Chicago 11.

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In requesting information concerning these appointments, we shall appreciate your mentioning the key letters. Burneice Larson, Director, The Medical Bureau, Palmolive Building, Chicago 11.

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says CROSBY

CROSBY:

Folks, this is fantastic, but old Hope has a great idea. He thinks *everybody* ought to give U. S. Savings Bonds for Christmas presents!

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Thanks for the kind words, son. But no kidding, ladies and gentlemen, those Bonds are sensational. They're appropriate for *anyone* on your list. On Christmas morning, nothing looks better in a stocking—except maybe Dorothy Lamour.

CROSBY:

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By now those of us who are privileged to be members of the dental profession have received a quantity of A.D.A. Relief Fund Seals . . . our invitation to contribute to the Relief Fund maintained to provide help to those dentists who are in need of financial assistance. This year's goal is $100,000.

Even in these days of comparative plenty, there are a number of dentists who, because of illness or accident, are totally unable to support themselves or their families. The A.D.A. Relief Fund, administered by the Council on Relief, is incorporated as a trust whose assets are perpetually dedicated to charitable purposes. There is no more worth-while cause in dentistry and supporting that cause is the responsibility of every one of us.

Contribute Now — As Much As You Can

Send Your Contribution to the American Dental Association Relief Fund
222 E. Superior St., Chicago 11, Ill.

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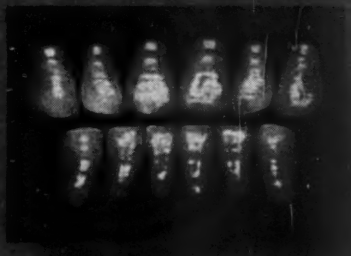

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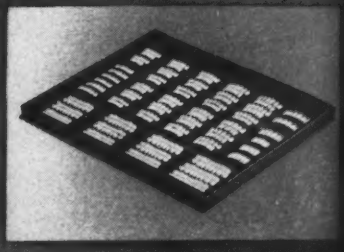

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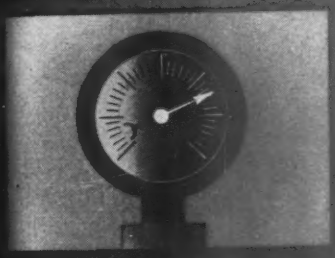

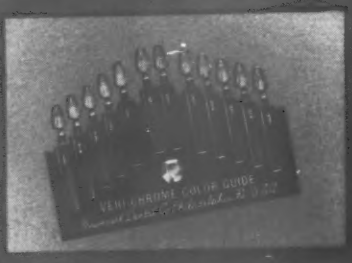

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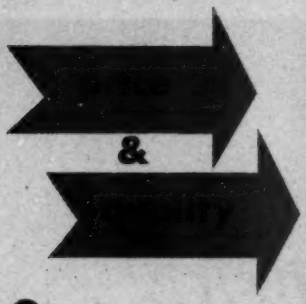

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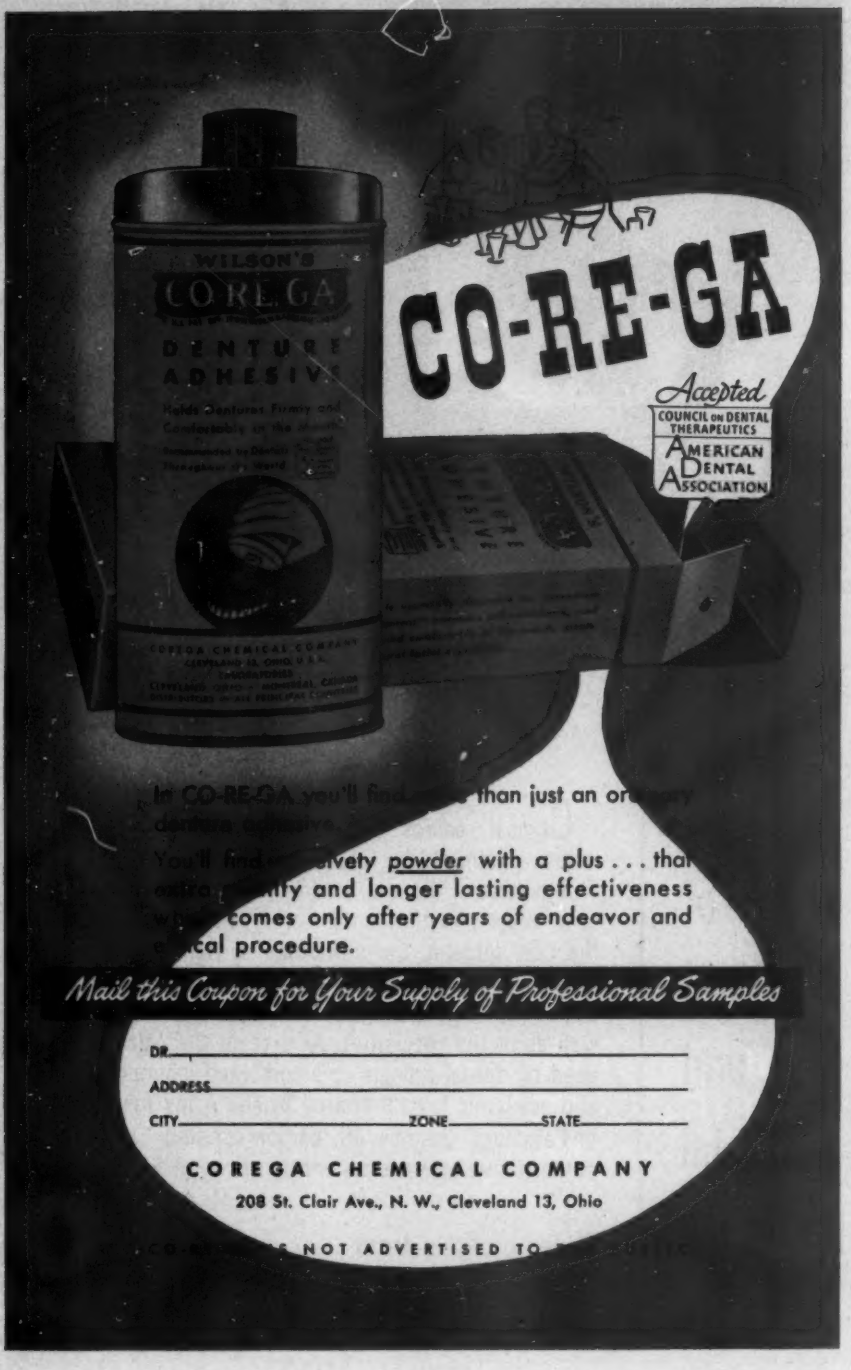

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Steele's

ANNOUNCE

APCO-HI

A new high fusing porcelain (matures at 2300°F) that *needs no mixing*. Saves time. Matches all New Hue shades accurately.

The colors of APCO-HI are factory blended to correspond with each of the twelve shades of the New Hue shade guide. There is a gingival body porcelain, and a translucent incisal porcelain for each New Hue shade. This greatly simplifies the problem for the dental Technician.

EXAMPLE: You wish to produce a crown to match New Hue shade 65. Select the jar of APCO-HI marked "Gingival—Shade 65" and that marked "Incisal—Shade 65." A combination of these two porcelains will accurately match New Hue shade 65.

APCO-HI is now available at your supply house in ¼ oz., ½ oz., 1 oz., ¼ lb., ½ lb. and 1 lb. jars. Also in standard assortments of 24 half ounce or quarter ounce jars.

Steele's

APCO-HI
(matures 2300°F)
and
APCO
(matures 1875°F)

These two porcelains now cover every requirement in the Dental Ceramic field. Both porcelains have physical properties that are outstanding. Note: The regular APCO porcelain (maturing at 1875°F) is not at present factory blended like new APCO-HI.

NEY-ORO G-3

"This is the finest!"

. . . not because *we* say so but because, over a period of many years, sales records show that a majority of users have made NEY-ORO G-3 their first choice in a gold color partial denture casting gold.

Why? Because Ney Research produced this precious Gold Alloy specifically to meet the requirements of modern partial denture work. Because it possesses, in a superlative degree, essential properties of TOUGHNESS, RESILIENCE and STRENGTH. Because it is easy to melt and cast . . . free from brittleness . . . with maximum physical properties developed by the simplest heat treatment.

NEY GOLD

THE J. M. NEY COMPANY
HARTFORD 1, CONN.

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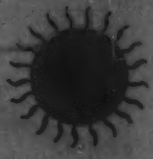
STRAIN FREE

Heat resistant. Will not distort in processing

BETTER ANATOMY

More suitable for full and partial dentures

COLOR FAST

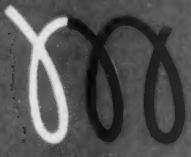


Permanent, non-fading fluorescence

Here is why dentists and technicians prefer

TRUBYTE ACRYLIC TEITH

BETTER BLEND OF SHADES

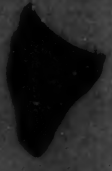


As Lifelike as Trubyte New Hue Teeth

MARBLED, DENSER

Grinds differently. Resists wear better

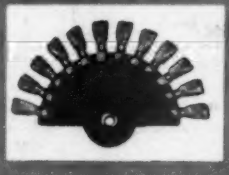
NATURAL SHADES



Accurate placement of enamel and dentine colors

BETTER SHADES

Match Trubyte New Hue Shades accurately



EASIER TO articulate

Popular 33° moulds. Sharp occlusal detail

Where acrylic teeth are indicated, specify

TRUBYTE ACRYLIC TEETH

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